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As the STREET RAILWAY GAZETTE is published 52 times a year, and is the only weekly publication devoted to Street Railway Interests, its value as an advertising medium will be apparent to Manufacturers and Dealers in Street Railway Apparatus and Supplies of every description. We will take pleasure in quoting rates for advertising space.

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European and American Rules.

The daily press is always ready to exploit the advantages of the "no seat, no fare" policy, but in practice it involves at times the most unpleasant consequences for the would-be passenger. A gentleman whose views on European railways are presented elsewhere in this issue notes this fact; and says the rule does not appear to be entirely commendable, when "you chase the last car for a block and find the seats filled, and are compelled to walk three or four miles home, while there is standing room for a score of people on the car." There is no doubt that for Americans the prevailing practice gives far less dissatisfaction than would follow the introduction of the English rule.

English Engineers and Electric Traction.

London *Engineering* makes the following cutting sort of a reference to the recent discussion on electric traction by the Institution of Electric Engineers in London: "Considering the magnitude of the subject and the probability that within a few years there will be great activity in this country in the matter of electrical tramways, the discussion was disappointing. Small and unimportant points were taken up, while the broad features of the subject were, for the most part, passed over with little notice. Possibly the speakers felt oppressed by the presence of several American engineers, and did not like to disclose how little practical acquaintance they had with the subject."

Good and Bad Fenders.

A correspondent, whose communication we print in this issue, seems to think that an editorial in the last number of the STREET RAILWAY GAZETTE was an indiscriminate attack on fenders. We gladly publish the communication, though we are at a loss to know how such an impression could be gained from the article in question. We were very careful to state that we objected to certain fenders that experience had proved to be worse than useless, and we deprecated the use of appliances of this type, on the ground that good fenders were procurable. No manufacturer of improved fenders, it seems to us, should feel aggrieved by our criticism of poor fenders, but rather should approve of it, for if it hastens the day when these misnamed life-saving devices are discarded, they will have the chance to substitute something of real value.

Delaying Street Cars.

An ordinance has been introduced in Philadelphia for the regulation of the delivery of coal and providing that street cars shall not be blocked by coal wagons. It goes without saying that such a measure should be passed in the interests of the public, but aldermanic bodies should not stop when they bring the refractory drivers of coal wagons to terms. They should not allow street cars to be blockaded by teams of any description. It seems an absurdity for councils to make rapid transit possible by granting privileges, and then to allow its usefulness to be seriously impaired by the activities of obstreperous truckmen. It speaks well for the patience of the public in all American cities that they have not demanded the strictest sort of regulations for the abatement of the aggravating nuisance caused by wagon drivers persistently stopping cars on all important thoroughfares, but patience sometimes ceases to be a virtue.

Trolley Cars and the Storm.

The street railways in a very large section of the country were subjected to the severest kind of a test by the storms of last week. In some localities the service was badly crippled, and in other places serious delays were occasioned, but a perusal of reports from a large number of cities leads to the conclusion that the street railway companies did remarkably well under the circumstances. The public uttered complaints as a matter of course whenever irregularties in the operation of cars occurred, but it is still satisfactory to note that, as a rule, the improvement in the service during the most trying conditions was somewhat generally recognized. In no city in the country was the operation of cars during the storms watched with as keen interest as in Philadelphia. Trolley cars have made their appearance in great numbers in that city within the last year and a half, but since their introduction they have not encountered heavy winter storms. The weather last week was considered sufficiently unpropitious to constitute an adequate test, and it is interesting to observe what the results are thought to be. The *Public Ledger* of that city devotes considerable space to the subject, and in contrast to the opinions of most daily papers on such topics its views are of interest and value. Its conclusion, regarding the trolley lines is that "it is a satisfaction to note that under the stress of a winter storm they show no inherent defects that cannot be remedied." During the storm no less than 10 horses were killed by electric shock, but not all of these fatalities are chargeable to the trolley wires. The conclusion drawn from several of these accidents, due to crosses caused by falling telephone and dead wires, is the necessity of guard wires, which in the case of most lines in the city have been dispensed with, except in a few special points. It is suggested that provision for removing all overhead conductors except the trolley wires be made, because "full protection can never be obtained until all other overhead wires have been swept away, for it is these that act as agents to do the mischief." The *Ledger* is an aggressive opponent of the plan of stopping cars at the near crossing, and in the experiences attending the operation of cars during the storm it finds argument against the Philadelphia practice. It says on this score: "The trolley companies were yesterday furnished the first opportunity to test the inconvenience, discomfort and even danger of stopping their cars on the 'near corner' rule. The experience of passengers in wading through the deep snow, slush and mud during the daytime, and of stumbling over the frozen ridges at night, instead of getting on and off the cars at the crossings, as in the ante-trolley days, demonstrated the undesirability of the change. This evil will have to be reformed in some way. Either the companies will have to clear a space a car length back from each 'near crossing for the accommodation of passengers, or while the streets are covered with slush and snow they will have to suspend their near crossing order and go back to the old practice."

NO FREE RIDES FOR POLICEMEN.

Attorney-General Hancock of New York State has expressed it as his opinion that by the provision of Section 5, Article XIII., of the new Constitution policemen are forbidden to accept free transportation on street railways. This prohibition, which is of so great interest to the policemen at the present time, is as follows:

"No public officer or person elected or appointed to a public office, under the laws of this State, shall directly ask, demand, accept or consent to receive, for his own use or benefit of another, any free pass, free transportation, franking privilege or discrimination in passenger, telegraph or telephone rates from any person or corporation, or make use of the same for himself or in conjunction with another. A person who violates any provision of this section shall be deemed guilty of a misdemeanor and shall forfeit his office at the suit of the Attorney-General. Any corporation or officer or agent thereof who shall offer or promise to a public officer, or person elected or appointed to a public office, any such free pass, free transportation, franking privilege or discrimination shall also be deemed guilty of a misdemeanor and liable to punishment except as herein provided. No person, officer or agent of a corporation giving any such free pass, free transportation, franking privilege or discrimination hereby prohibited shall be privileged from testifying in relation thereto, and he shall not be liable to civil or criminal prosecution therefor if he shall testify to the giving of the same."

Mr. Hancock has given it as his opinion that firemen are not affected by this provision, but holds that policemen are public officers and that it is illegal for them to ride on the street cars free, and while he is convinced that the courts should pass upon the section, he is convinced that it would be a violation of the law to allow them to ride on the cars free.

At a recent meeting of the Police Board in New York a communication from Superintendent Byrnes called attention to the matter in the following terms:

. . . The privileges of free transportation and the use of the telephone that have been accorded to officers of the force of this department in the past have been of incalculable advantage to the public in the increased efficiency of the force and the better protection to public life and property and the preservation of public order.

In view of the fact that by the new Constitution the police force will be deprived of the privileges above referred to after Jan. 1, 1895, it is necessary that your board make provision before that date, to the end that the public service may not be impaired on account of the withdrawal of these privileges.

ST. LOUIS AMBULANCE CAR.

The city hospital car, the first of its kind in the United States, which was described by Richard McCulloch in his paper at the Atlanta convention, made its initial trip in St. Louis last week. It was manned by an ambulance surgeon, a male attendant as nurse and a motorman, in addition to several prominent citizens. A time-card will be prepared and published, in order that the police and public may know when the car will be due at a given street or designated point.

The car is 33 feet long over all, and inside 24, by 7 feet 2 inches wide. The doors are at the right-hand side of the ends of the car, the steps being placed obliquely and affording access from either front or side, so as to facilitate the entrance and exit of litter-bearers.

The car is divided in the middle by a wooden partition 5 feet 6 inches high, one compartment being for males and the other for females. Both parts of the partition may be swung back if desired.

FENDERS FOR TROLLEY CARS.

Editor STREET RAILWAY GAZETTE: In your Dec. 29 issue an article appears on "Useless Fenders in Service," which is a reflection on all fenders now in use, and seems to us as having been written without proper foundation, hence we beg to make a statement in our own behalf. Certain fenders are in use in Boston, Brooklyn, Newark, Jersey City, Buffalo, which we will let the makers therof defend. The Crawford fenders are in use on 27 railways, to the extent of over 2,800, and all the companies state their satisfaction with them. The record indicates that our fenders saved about 100 lives during their use in 1894. By writing to the various railway companies, as per inclosed list, they will verify our statement.

As to the mandates or ordinances of councils, the railway companies usually want the councils to specify what fender will be satisfactory to them, so as to avoid equipping a road with some fender that councils may order removed: then if councils in their experience in specifying fenders, should select an inferior one, the responsibility rests with the people's representatives instead of the railway companies.

It is conceded by the railway managers that the necessity of having a good fender equipment exists; but between the ideas of councils, the public and numerous inventors the companies are between the deep sea and the devil in trying to please all parties concerned.

We are more than willing to have the decisions of railway managers on the practical merits of our Crawford fenders, and prefer to have the managers examine our fenders, then decide, rather than to leave the subject to the decision of other than railway men.

Trusting you will do us the justice of correcting the wrong impression that may be created by the article, so far as we are concerned, we are yours very truly,

R. A. CRAWFORD MANUFACTURING COMPANY,
H. N. Crawford, Secretary.
PITTSBURGH, Dec. 31, 1894.

SUSQUEHANNA ELECTRIC POWER PLANT.

The announcement that the Susquehanna Electric Company of Baltimore had been organized to utilize the power of the Susquehanna River at Conowingo, has already been made. One of the directors authorizes the following statement of the purposes of the company:

"The present company," he says, "is simply organized for construction purposes, and will undertake the work of building the dam and power-generating station near Conowingo, Md. A parent company, as it is termed, is now being formed in Baltimore, and will give financial backing to the enterprise. The company will be capitalized at over $1,000,000, and several bankers and business men of unquestionable standing are to be interested in it as heavy stockholders. The names of these members will be a guarantee of the magnitude of the corporation. They will be financially responsible for the dam and power-house construction; also for the power-distributing station, which is to be erected in the suburbs of Baltimore. This station will be large enough to distribute the 35,000 horse-power to street and other railroads, factories and for any other purpose desired. It will also contain facilities for storage of power on a large scale by the latest improved mode. While the parent company will control the use of this power and own the dam, stations, etc., branch companies are to be formed in Baltimore and any other city or town where the power is transmitted to any extent. The branches will pay the parent concern so much for their franchise, and rent the power in the district where they are incorporated."

GOVERNOR PATTISON AND STREET RAILWAYS.

In his annual message Governor Pattison, of Pennsylvania, has this to say regarding street railways:

It has become the fashion for corporations, under the plea of a healthful competition, to secure special franchises from municipalities on their streets, and, these once secured, immediately to effect consolidation with others—all the parties to such combinations pooling their issues and violating the very essence of the conditions upon which they obtain their grants. To prevent these, I am of the opinion that the Legislature should prescribe regulations similar to those of the 4th section of Article XVII of the Constitution, relating to parallel and competing lines of railroads or canals. Competing lines of passenger railway, gas, water or electrical companies should not be allowed to effect consolidations and combinations hostile to the interests of the Commonwealth or of the citizens of municipalities which have granted them rights for the express purpose of obtaining the benefits of competition.

The State, too, should receive adequate returns in the nature of increased and increasing taxes upon this class of railroads in connection with any enlargement of their rights and privileges. The recent decision of the courts, that there is no provision in this Commonwealth for elevated railways, remands that question to the Legislature.

NEW YORK RAPID TRANSIT.

At the meeting of the New York Rapid Transit Commissioners last Wednesday, President Orr named the following committee of five engineers to consider the plan of rapid transit presented at the previous meeting by Chief Engineer Parsons: Abram S. Hewitt, Thomas C. Clarke, Charles Sooysmith, William H. Burr and Octave Chanute. This committee was appointed under a resolution of the board to go over the figures given by Mr. Parsons. His estimate of the work was $66 000,000. If the committee finds that the probable cost has not been exaggerated, the members will be asked to suggest means for curtailing the plans of Mr. Parsons so that the cost will be brought within the $50,000,000 which the board is authorized to spend.

THE CAR-WHEEL FOUNDER'S PROBLEM.

Not a little has been said about cheap car wheels in the past 18 months. More will be heard on the the subject, doubtless, when the day comes for removing some of the wheels that have been put under cars since the advent of the ¾c.-a-pound product. That there is a wide variance in the length of service of different makes of wheels is the testimony of records kept by the motive power departments of the railroads; and since wheel founders who use the more expensive mixtures have declined to receive from the railroads old wheels of certain other makes, there has been a more careful study of the subject by the railroads from the standpoint of ultimate economy. The stringent policy of expense reduction pursued by the purchasing agents of all lines, together with the fact that wheels are taken under explicit guarantees of service, has given the lowest-priced wheel a wider market than it would secure under ordinary conditions.

The superintendent of an ore-carrying railroad in the upper peninsula of Michigan called the attention of a pig-iron producer, not long ago, to a wheel which had just been sent to the scrap pile, and remarked that it had been in constant use 25 years. He asked as to the character of the iron in it, and the natural inquiry came next, why equally long-lived wheels had not been available to railroads in recent years. The reply was that the wheel in question was made of all charcoal iron, and that no doubt the wheel could be duplicated to-day if the buyer were willing to pay the price. On the other hand, car-wheel makers whose mixture is coke iron and scrap are making as high mileage guarantees as their competitors whose mixtures are more expensive, and it is even intimated that some of them who are now guaranteeing 80,000 miles are prepared to increase the figure to 100,000 miles, and to furnish wheels that will stand the most rigid tests of the railroad companies. The chemist, it need hardly be said, is an important factor in such results, and it is the testimony, of those who have made most use of him that the high-priced mixtures of the old school car-wheel maker represent an increment of cost several times the salary of a well-paid chemist. The car-wheel records of the railroads for the next few years will furnish the data that will determine which policy is to prevail in the long run.—*Iron Trade Review.*

NEED OF GOOD BRAKES.—Trolley car brakes are held responsible for many collisions, and probably more frequent inspection of the cars en route on the long lines is desirable. The integrity of the brake was not such an important consideration in the management of the horse cars, but it is the trolley car, particularly where there is a decided down grade. Steam railway trains are regularly inspected at certain intervals. Possibly such a course would prevent collisions on the electric roads. The condition of the tracks and the care of the motorman are, however, the most important elements of safety on all occasions.—*Philadelphia Public Ledger.*

THE WORKS OF THE BERLIN IRON BRIDGE COMPANY.

The name of the Berlin Iron Bridge Company is by no means an adequate descriptive title. It is not sufficiently comprehensive. The construction of bridges is but a single department in the company's scheme of manufacture, and yet this may be said of the products of the plant, varied as they may be in size and form, ranging from a massive bridge structure to an ornamental lawn fence, from a power station to a trolley pole, that they are simple enough, as far as the material is concerned. Iron and steel comprise the raw materials which the company works up into an infinitude of forms great and small.

It is doubtless true that the Berlin Iron Bridge Company is associated in the public mind, especially in New England and New York, with the construction of iron bridges. This fact is not surprising when it is known that in these States the company has erected 90 per cent. of all the iron highway bridges that have been put up within the last ten years, and has, in fact, built more bridges in these States than all other bridge companies in the country combined, yet the name of the company is associated with another form of structure in the mind of the street railway manager who has a power plant on his hands. It suggests to him rather the very latest type of power station, one that embodies modern ideas, that is designed with an intelligent appreciation of the purpose for which it is to be used, that need not be insured at a ruinous rate that will eat up the profits of the business. Such a power-house, which fortunately may be seen in a great many places in the country, especially in New England, is surely as much of a scientific construction as an iron railroad or an iron bridge, and its production forms an essential part in the Berlin Iron Bridge Company's scheme of manufacture.

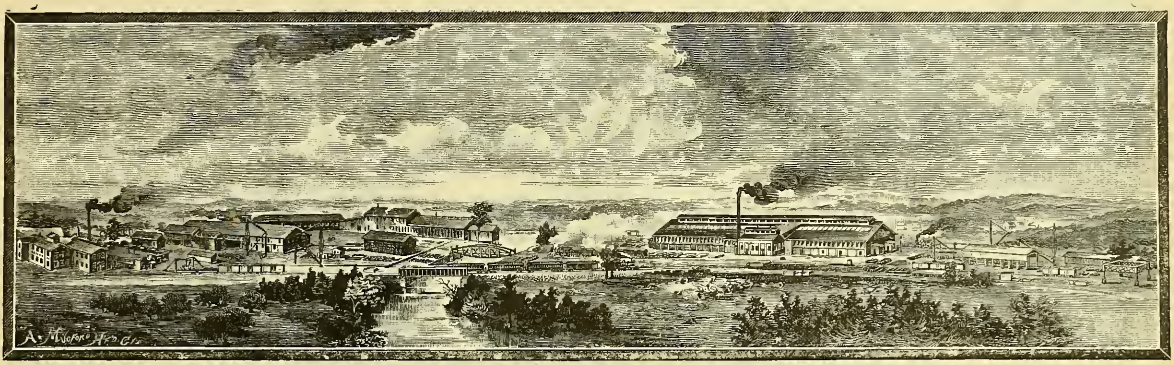

FIG. 1.—BIRD'S-EYE VIEW OF THE BERLIN IRON BRIDGE WORKS.

It is the purpose of this article to give the briefest sort of a description of the works of the company; an adequate description of the plant, stretching, as it does, over 13 acres, is, in fact, out of the question in the limits of space here available. It should be stated, by way of preface, that the splendid business of the company has been built up within the last quarter of a century. The Berlin Iron Bridge Company was organized in August, 1871. The works, of which a general view is given in Fig. 1, are located at East Berlin, on the Middletown branch of the New York, New Haven & Hartford Railroad. The greater part of the thirteen acres, which the company utilizes at this point, is covered by buildings, and the rest is used for the storage of raw material and the finished product The railroad facilities for receiving and shipping are admirable. The method of handling the ponderous masses of iron and steel that are manufactured into structural material has been planned with the realizing sense that the minimum of labor means, generally speaking, the maximum of economy in production. Several sidings from the New York, New Haven & Hartford Railroad extend into the grounds, and three miles of narrow gauge track have been laid, connecting the various manufacturing buildings. The rolling stock that traverses this network of tracks, comprises 125 iron cars. Numerous turntables and transfer tables are provided, so that the work can be speedily delivered to any department.

It may be well in presenting a brief description of the plant, to start at the office building, as the work may be said to originate at this point. The offices of the company are located in a substantial two-story building at the northern end of the grounds, within a short distance of the railroad station.

The drafting-rooms occupy well-lighted apartments in the upper story of the building and are equipped with all the conveniences that tend to facilitate the important part of the work executed here. One of the rooms is illustrated in Fig. 3.

No company in the country has had a keener appreciation of the fact that not every one is gifted with the trained imaginative sense that can gain the proper significance from diagrammatic drawings, and construct from them, in the mind's eye, a representation in three dimensions. The company, therefore, has used photographs and perspective drawings of structures it has built in the most lavish way, to enable customers to gain an adequate idea of structural forms and to determine from them the character of work that they may prefer. Its policy in this respect has been so marked that every reader of technical publications is familiar with the outlines of its characteristic buildings and structures. This graphic method of familiarizing the public with its work has necessarily involved an elaborate system for storing cuts, electrotypes and photographs and making them available for use as a moment's notice, Adjoining the offices a fireproof room is located, in which the engravings and photographs, which have cost a small fortune, are stored. Arranged along the walls of the room are shelves divided into small compartments for receiving the cuts. Each division is numbered and every cut bears the number of its compartment. A large album, containing proofs of all the engravings, each of which has a number, corresponding to that of the compartment in which the cut is placed, makes the system complete. The same system is followed in filing photographs. Such an arrangement makes it easy to find, with the least possible delay, any cut, electrotype or photograph that has ever been made.

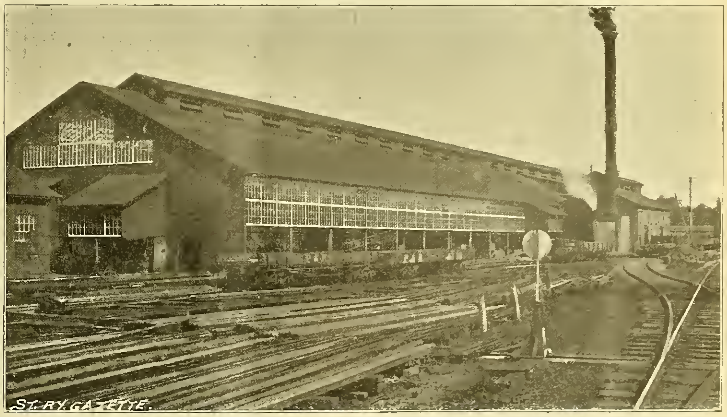

FIG. 2.—TRUSS SHOP—BERLIN IRON BRIDGE WORKS.

The arrangement of the manufacturing departments is such that the movement of work from the drafting-room at the north end of the grounds is from north to south. The painting shops, where the final touches are put upon the iron and steel and the derricks for loading the product on the cars, are, therefore, located at the southern boundary of the grounds. It is exceedingly interesting to follow the manufacture of the heavy work in its progress toward completion; and a brief reference to the plan that has been adopted in the case of the iron and steel trusses for bridges, as comprising the most ponderous class of manufacture that is undertaken, as well as that which gives to the company its name, may not be amiss. What is said in this connection about bridgework holds good in reference to most of the heavy work that passes through the shops, including of course that which is designed for electric power stations, After the work has been planned in the engineer's department, the drawings are made and are sent to the templet shops, Fig. 4, where wooden templets are made. All the work is laid out with United States standard steel tapes. This department occupies a large, well-lighted building 200 feet long and 75 feet in width, and is thoroughly equipped with the latest types of wood-working machinery, including boring machines, band, circular and cutting off saws and surface planers and turning lathes. Adjoining the templet shops is the lumber shop, in which huge piles of seasoned lumber are kept constantly on hand. From this department the templets are taken to the laying out shop, which is a building 90 × 100 feet, where the iron and steel are laid out and center-marked. The material is then delivered on iron cars to the truss or assembling department, a building which is constructed entirely of iron and glass, with dimensions of 100 × 400 feet. An exterior view of this structure is given in Fig. 2. Both sides of the building are inclosed by glass, and skylights extend the entire length of the roof. Interior views of this department are given in Figs. 5 and 6. The shop is completely equipped with the most modern and the most approved machinery, and numerous traveling cranes are available to deliver the great masses of steel and iron quickly to any part of the building. Several railroad tracks extend the entire length of the shop to provide for speedy transportation. When the material is received from the laying out shop, it is first cut into the required lengths by power shears especially designed for the purpose, Fig. 7. The angle iron is cut by a special machine shown in Fig. 8, which will shear the material up to 6 × 6 × 1 inch. After leaving the shears, the material is punched for rivets and is then assembled. The riveting is done by a specially designed pneumatic machine. After bridgework has been riveted, the assembled parts are passed to a rotary planer, by which the ends are surfaced, after which holes for the pins are bored. By this time the work has reached the southern end of the building, and is ready for painting and loading on the cars. At every stage in the progress of the work, all possible precaution is taken to insure the utmost thoroughness and to eliminate every flaw in the completed work. In all the departments the work is carefully examined by an experienced inspector before it leaves the shop, and the finished work is examined by a final inspector, who is responsible for all the work that leaves the grounds.

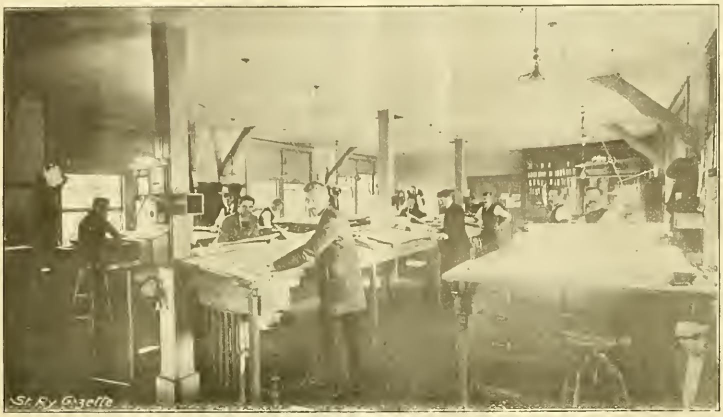

FIG. 3.—DRAFTING ROOM—BERLIN IRON BRIDGE WORKS.

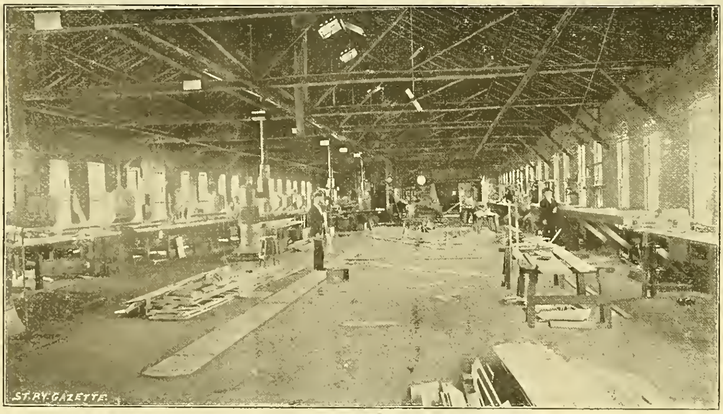

FIG. 4.—TEMPLET SHOP—BERLIN IRON BRIDGE WORKS.

The truss shop has its own power station. The plant is located in the small building that adjoins the main structure on the left, in Fig. 1. In this plant steam is generated in three horizontal tubular boilers of 70 H. P. each, and power is furnished by a 60 H. P. Buckeye engine. The air compressor built by the Norwalk Iron Works supplies the compressed air for operating the riveting machines and reamers, and a Sturtevant blower furnished the blast for the rivet-heating furnaces. The truss shop is heated by means of hot air, forced by a Sturtevant fan through coils heated by exhaust steam. The blower is operated by a separate 6 H. P. engine directly connected to the fan. The heating apparatus is located on the floor above the engine-room.

It has already been remarked that in addition to the buildings employed in the construction of material for bridges, there are numerous other departments devoted to the manufacture of specialties in iron and steel. Among these is one building 200 feet long by 40 feet wide, in which corrugated iron for roofing, siding, fireproof doors and shutters is manufactured. The shop is provided with all necessary machinery for pressing steel, and a specially designed machine is employed for rolling the corrugated iron.

The machine shop is 160 by 70 feet, and is equipped with large lathes and planers, built by the Putnam Machine Works, and many smaller machine tools furnished by the Bridgeport Machine Tool Works. The forging department occupies a building 230 by 50 feet, and contains all the tools necessary for the heaviest kind of work, including a ten-ton steam hammer, riveting machine, blowers, plate-cutters and forging machine. A special rolling machine that is used for straightening plates is illustrated in Fig. 10. This work was formerly done by hammer, but the new machine executes it far more quickly and in a much more satisfactory manner, giving at the same time a better finish to the plates. The roll was built by Hilles and Jones, of Wilmington, Del., and will straighten a plate as wide as 108 inches. The building in which this machine is located is constructed entirely of iron and its dimensions are 125 by 80 feet. In Fig. 11 is shown a view of the room in which the erecting tools are stored. The building in which this department is located is constructed entirely of iron with glass roof. The tools are shipped to the place where work is to be done in boxes built especially for the purpose, and a record is kept of all apparatus that is sent out. Tools are inspected when they are returned to the storeroom, and those that have been injured are either condemned or sent to the repair shops. The heavy work that is done by the company demands a very large assortment of material of this kind, and a small fortune is locked up in the tools, ropes and other devices that are stored in this department. The power for the works is furnished by 22 engines of the Buckeye and Westinghouse types, ranging in size from 6 to 100 H. P. The grounds and numerous buildings, most

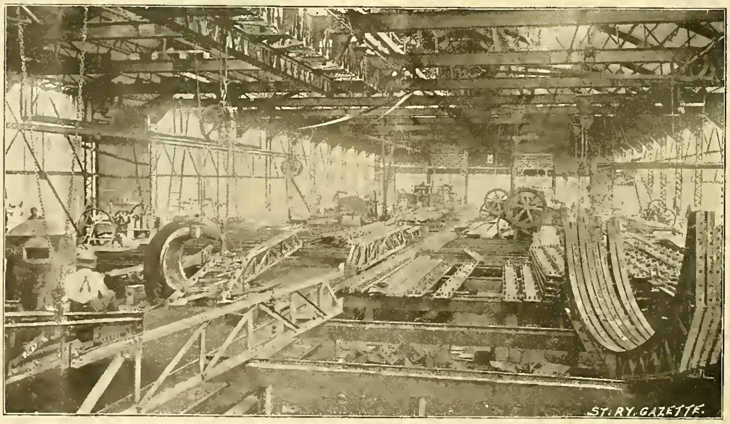

FIG. 5.—INTERIOR VIEW OF TRUSS SHOP—BERLIN IRON BRIDGE WORKS.

of which are constructed of iron, are illuminate by arc and incandescent lamps, the current being provided by two lighting plants. The generators were furnished by the General Electric, Westinghouse and Mather companies.

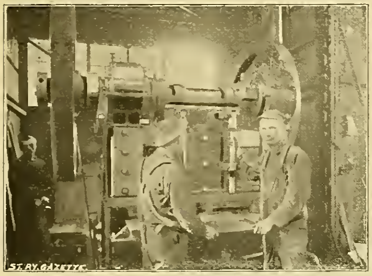

Fig. 5.—Plate Shearer.

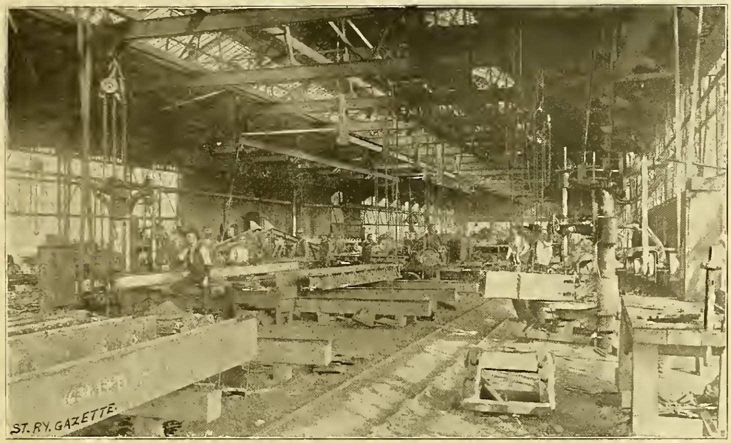

FIG. 6.—INTERIOR OF TRUSS SHOP,—BERLIN IRON BRIDGE WORKS.

The company employs in its various departments about 1,200 men. The office force alone consists of 100 men, including engineers, draftsmen, stenographers, telegraph operators, etc. The shop force consists of about 450 men, and the company employ from 300 to 700 men in different parts of the country putting up work.

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CAR HEATING IN CINCINNATI.

John Kilgour, President of the Cincinnati Consolidated Street Railway Company, was recently asked what the company was doing in regard to protecting motormen and heating its cars. He said:

"We are obeying the law as fast as we can. We are substituting new electric cars on the lines, and all of these, as you observe, are vestibuled and provided with a heating apparatus. But we have been delayed by litigation." He explained that the Consolidated was making its own heaters for the electric cars, and because of the enterprise an electric heating company was endeavoring to enjoin the Consolidated from the manufacture of the heaters, claiming its patents were infringed.

"Our attorney assures us," continued Mr. Kilgour, "that we are not infringing, so we are again making heaters and are putting them in as fast as we can. But this has delayed us, and has also delayed the vestibuling, because the new cars are vestibuled.

"The heating of cars is all nonsense. I have submitted a letter to the Board of Administration, asking it to look into the matter and make some recommendations. We are willing to heat the cars. but how shall we regulate the heat? I came down street in a car to-day and it was so hot it gave me a headache. The conductor, standing outside in the cold, is not competent to judge whether or not the car is properly heated, so the question arises, Who shall regulate the heat? When a car is full of people, artificial heat is superfluous. A strong, healthy person doesn't want the heat. A sickly person naturally does. I believe the healthy person has a right to be considered as well as the other people,"

EUROPEAN STREET RAILWAYS.

The following opinion of urban transportation on the other side of the Atlantic appeared in the form of an interview in a recent issue of the New York *Sun*. It is interesting and it is different from much that appears in the daily press regarding European street railway facilities, in that it expresses the truth:

"London has, perhaps, in her underground system and its connections the nearest approach to rapid transit of any European city. It is convenient if you want to travel in the line of its circles, but is slower than the omnibuses if you want to cross the city inside the circle. In New York you can quickly get within a block or two of almost any point by the elevated. Comfort is not a point on which the Londoners claim much for the underground. David Christie Murray was free to admit here the other day that it is 'a stenching nuisance' to every unfortunate passenger compelled to use it. I met lots of Londoners who could not use the underground because of its suffocating stenches. It made my wife positively ill this summer. The omnibuses and tram cars of London are plentiful enough, and convenient in their way, but they are not rapid. London's most rapid means of transit system is its rubber-tired hansoms. They are a constant delight. Very much has been done to perfect the pavements of London within the past four or five years, and there are dozens of miles of the principal streets paved with the smoothest and most nicely graded asphalt and wood, over which the springy hansoms roll on their thick rubber tires at a very lively gait and with the utmost comfort to the occupant, if he isn't at all nervous. One night last September I rode 5½ miles in 27 minutes. But it cost 75 cents.

"In Liverpool, the second largest city in the British Empire, the transit facilities are almost grotesque. The city is gridironed with tramways, and the cars are comfortable enough, except on cold or wet days, but I don't think any one there ever supposed that the expeditious transportation of citizens about the city was part of their purpose. The routes are most circuitous, and on all but perhaps three or four it is as easy to walk as quickly from the starting place to the centering point, at the Town Hall or the pier head, as the tram will make it. Quite frequently I have started from one end of a route at the time a car started, and walking at an ordinary pace have reached the other end before the same car. For instance, the tram cars from Everton to the Town Hall cover a distance in as straight a line as a man may walk of about two and a half miles, and take three-quarters of an hour to do it. They go in a most exasperating, roundabout way, for the only reason, as I could learn, of covering as much territory as possible, and thus carrying the more passengers. All street cars in Liverpool stop running at 11 o'clock at night, as they do in practically all towns in Great Britain, even in London. After that time you must foot it or hire a hack.

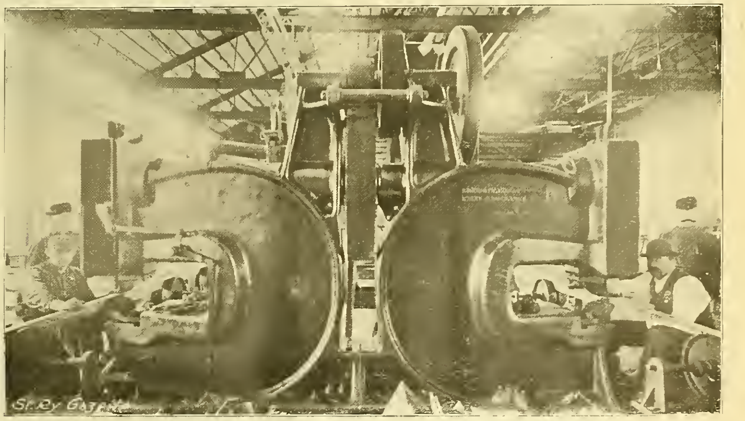

FIG. 9.—DOUBLE PUNCH—BERLIN IRON BRIDGE WORKS.

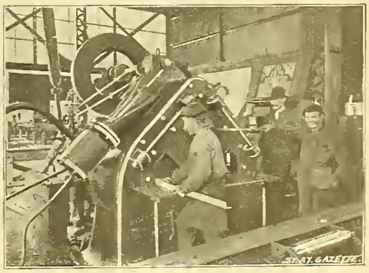

Fig. 8.—Angle Shearer.

"Then a car may only carry as many passengers as there are seats for. This seems a very proper and commendable rule until you chase the last car for a block and find the seats filled and are compelled to walk three or four miles home, while there is standing room for a score of people on the car. Because of this provision you are frequently compelled to walk half a mile or so toward the starting place of the cars in order to get a chance to ride. Lime street, the shopping center of Liverpool, is about a quarter of a mile from the starting place of all the tram cars, except those of three routes. The cars usually fill up at the start, and so the majority of passengers must perforce walk there or walk home. This is especially exasperating on Saturday nights, when every one is out marketing. You will see a stream of people walking toward the Town Hall, and when you get there a quarter of an hour before the last car starts you find three times as many people waiting for it as it can carry. Then you must scrimmage for a place. If the conductor, on starting, finds too many passengers aboard, some one has got to go. Of course there is rarely any means of knowing who was last to get aboard, and the invariable result is rank injustice, and the man with the most gall gets the seat.

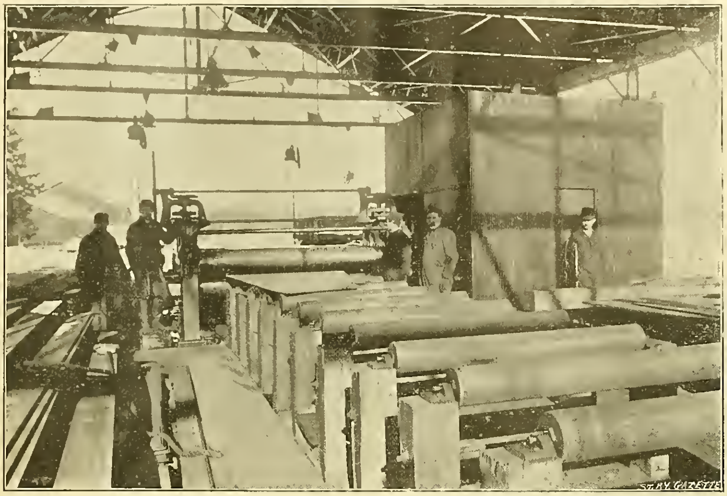

FIG. 10.—PLATE ROLLS—BERLIN IRON BRIDGE WORKS.

"Of course, the idea is that the car company must put on enough cars to accommodate the traffic. But it doesn't. The cars run 7 to 15 minutes apart, even on the most crowded routes. I have on one or two occasions waited three-quarters of an hour for a chance of a seat, and have at last had to take my place in the rush line, and submit to the trampling and mauling of the mob. Getting a seat on a street car and a seat in a theatre are about the same thing on a crowded night ; a thing to remember with horror.

"The criticism with regard to night stoppage, seat limitation, and scrimmage is true of every city in Great Britain. And on the score of comfort the transit facilities are about on a par. Stoves in street cars are unknown. Indeed, only last winter was any practical effort made to warm railroad cars for long journeys. Outside seats are a luxury in hot summer weather, but when you are compelled to occupy one on a cold, wet day your ideas are subject to revision. But as there are more seats outside than inside, you are often compelled to ride on top. It's a pleasant experience to sit on a wet wool seat for an hour while the car jogs you along a couple of miles or so. Open cars for summer and closed cars for winter are not a feature of European transit facilities.

"Some efforts at a system of rapid transit have been made in a few British cities, but what I saw did not commend themselves to me. Birmingham runs most of its street cars with dummy engines, which use coke for fuel, make a most stenchful smoke, and scatter cinders over everything. The engines are decidedly ugly and atrociously dirty. They make about one and a half times ordinary horse speed. The cars are almost as long as an elevated car, but very much lighter in construction. They have outside seats on the roof, but no one could ride on these seats because of the vile gas from the coke fuel, and the scattering of cinders. So the tops of the cars have been boxed over with a roof about four feet high from the roof floor, and the ends closed with glass doors so as to keep out the smoke and cinders. This second roof is so low that passengers have to stoop a foot or so in order to make their way under it to the seats. A wretchedly uncomfortable arrangement I found it. This system has been in operation about 10 years. It is an advance over horse traction as far as speed goes, but it isn't rapid nor comfortable, though it is of some convenience. Several cable railroads have lately been built in Birmingham.

"Leeds and one or two other English towns have the dummy-engine system of street transit, and the general features are the same as in Birmingham. London has one or two short cable roads in the suburbs, and electric cars are being experimented with in some places. Manchester's transit facilities are confined to omnibuses and tram cars, with the same unpleasant features mentioned of Liverpool's system, so far as comfort is concerned. Manchester's system is extensive and comparatively direct, but only the favored few, who catch their seats early, may ride, and the whole business shuts down before midnight. Liverpool's new electric elevated railway, while admirable and a success so far as it goes, is only a convenience for people having business along the line of docks. But it is the nearest approach to rapid transit, as we have it in New York, that I saw in all Europe.

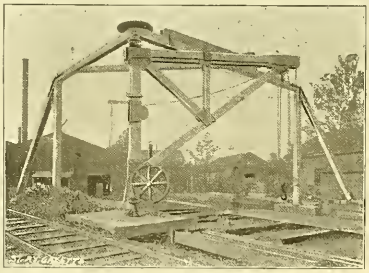

Fig. 12.—Loading Derrick.

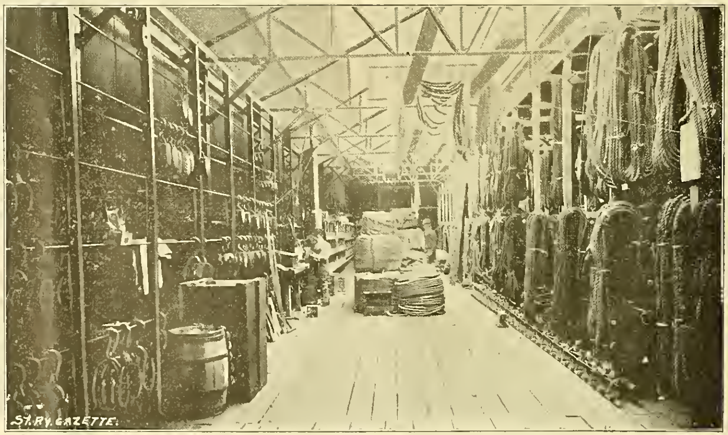

FIG. 11.—STOREROOM—BERLIN IRON BRIDGE WORKS.

"The urban transit facilities of Continental cities consist almost entirely of horse traction systems. Some have circle railways, but these of course are of no avail when you want to travel within the circle, where, as a rule, the most traveling is done. Many have good enough systems for getting in or out of the city, but few have what we would consider good facilities for getting about the city. And there is always the limitation of the number of passengers to the number of seats. In Paris you can't even scrimmage for a seat. You buy a numbered ticket at the omnibus station, and take your chance of there ever being enough seats or enough omnibuses for your number to be reached. Perhaps you would give up and walk home in disgust, as I have often done. It's bad enough to have to hang onto a strap during half's an hour's ride, but worse to wait an hour for a seat and then walk home. This doesn't prove that our system of jamming a car as full of people as can be crowded in between floor and roof is the best system on earth, but it shows that there are two sides to the question of seats or straps.

"My experience, which has been wide and general, and is up to date, has convinced me that no European town has an urban transit system that for convenience and quickness can compare with that of any ordinary American town. And certainly no capital in Europe has a system to equal New York's for cheapness, convenience and quickness, and, I might add, in most cases and on general grounds, not even for comfort. The quickest transit offered to the average man for an average journey in European cities is the cab, and while this is usually comfortable and reasonably cheap, it is neither as cheap nor as quick as our elevated or cable cars."

THE THREE-WIRE TROLLEY SYSTEM AT ST. LOUIS, MO., AND BELLEVILLE, ILL *

BY W. C. GOTSHALL.

At the last street railway convention the General Electric Company formally presented to the public their three-wire system, which they had been perfecting for some time. In the early part of October I commenced installing the three-wire system on the Union Depot Railroad Company's system, of St. Louis, Mo., and before the General Electric Company, had introduced it to the public we were operating under it. We have now been operating for some time on the three-wire system. We have our farthest and heaviest section on this system. It is on our down town section and in a locality where we cross six other roads, and have 12 overhead crossings to contend with, and some of them double crossings.

On one part of this section we occupy joint track

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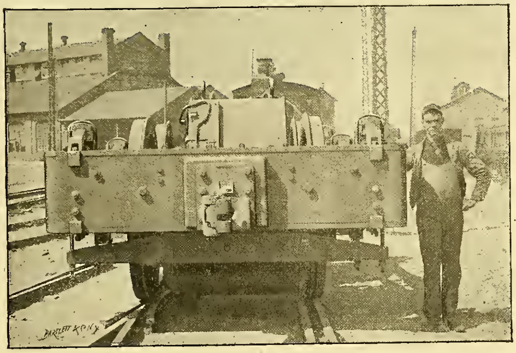
*Electrical Engineer.

with another road, but use separate trolley wires. The two wires are within twelve inches of each other and cross each other twice. At first numerous difficulties were encountered, but they have all been overcome. Some very interesting results have been obtained and the company is delighted with the showing.

The voltage on this section was formerly very low in the morning and evening. It is now all that could be desired. The lamps burn brightly and we are enabled to make better time and run more cars. There are many crossings and switches on this section, even excepting those of other companies, and altogether its success in this instance is very gratifying.

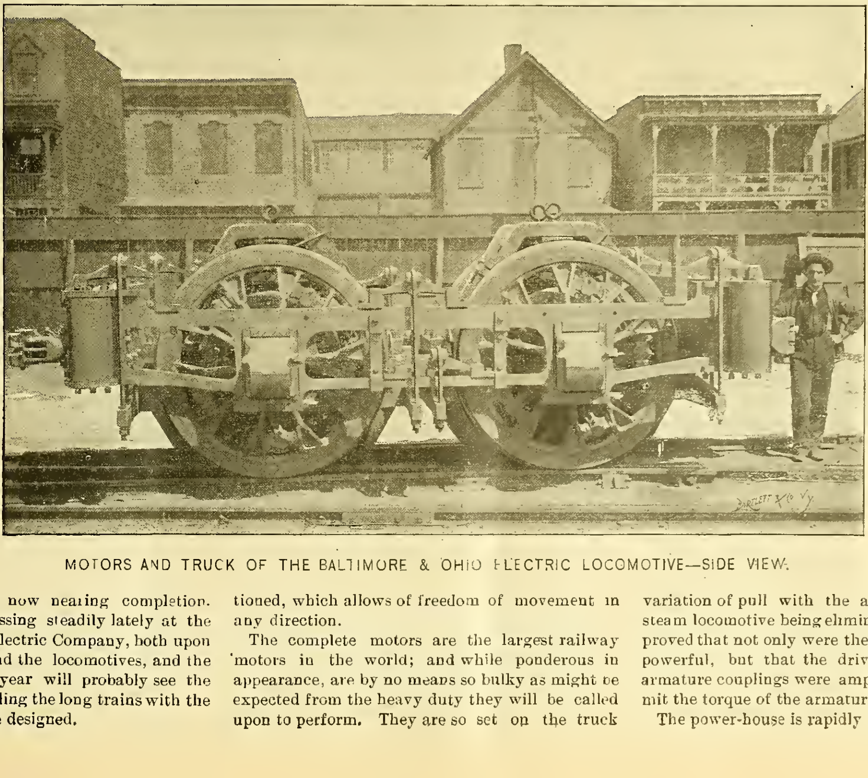
As the Union Depot Company operate some 250 cars the importance of its success to this company can readily be seen. The experimental work has all been carried on with D 62 machines. Preparations are now being made to establish it permanently and change the rest of the system. I trust that this information may be of interest as indicating and recording another successful step in the direction of economy in the use of power and copper on street railway circuits.



MOTORS AND TRUCK OF THE BALTIMORE & OHIO ELECTRIC LOCOMOTIVE—END VIEW.

ELECTRIC LOCOMOTIVES FOR THE BALTIMORE TUNNEL.

The work of preparation for the operation of passenger and freight trains in the Belt Line tunnel of the Baltimore & Ohio Railroad, at Baltimore, by locomotives in which the sole propulsive power will be electricity, is now nearing completion. Work has been progressing steadily lately at the works of the General Electric Company, both upon the generating plant and the locomotives, and the early part of this new year will probably see the huge locomotives handling the long trains with the ease for which they are designed.



MOTORS AND TRUCK OF THE BALTIMORE & OHIO ELECTRIC LOCOMOTIVE—SIDE VIEW.

This experiment will be the first practical step in this country toward the subjection of the steam trunk railroad to electricity. Two comparatively small locomotives, one of 30 tons and the other of 40 tons on the drivers, are already running, but not upon any important lines, and while perfectly successful their operation gives but little clue to the outcome of the practical tests on the Baltimore & Ohio road. The delay that has occurred in the completion of the work has been of advantage in that it has allowed of the embodiment in this apparatus of all the recent improvements in electric railway practice.

The trucks are of forged iron, each resting upon four driving wheels of cast steel, 62 inches in diameter. Flelibly supported upon each of these trucks are two six pole gearless motors, one for each axle, transmitting their motion from the armatures to the wheels by means of an especially designed flexible coupling. The method of spring suspension has been carefully modified to allow of the immediate adjustment of the wheels to the irregularities of the tracks, and thus effect a diminution in the wear both to the motors and the track. The massive armatures are of the iron-clad type. A hollow shaft serves to carry the armature, and through this passes the wheel axle, to which it is connected by the universal coupling already mentioned, which allows of freedom of movement in any direction.

The complete motors are the largest railway motors in the world; and while ponderous in appearance, are by no means so bulky as might be expected from the heavy duty they will be called upon to perform. They are so set on the truck that they will be easy of access under all circumstances, whether the locomotive is at a standstill or in motion.

The cab, which will be spring-supported on the truck frame, will be of sheet iron and wood, and will have windows on all sides, in order that the occupants may have an unobstructed view in all directions. Within the cab will be set up the series parallel controller, by means of which the movements of the locomotive will be at the command of the driver, and the air-pump, operated by a small electric motor, which will supply the air for the compressed air brakes and the whistles. The locomotive will be also equipped with bells, safety devices, etc., and will have a Janney automatic coupler at each end.

From the illustration of one truck, it will be seen that the finished locomotive will be an imposing piece of electrical machinery. It will weigh, in its completed state, 95 tons, will be 14 feet 3 inches long, 9 feet 6¾ inches wide, and will be of standard gauge. The maximum speed will be 50 miles an hour. This will be reduced to 30 miles an hour when only half the drawbar pull is exerted, and to 15 miles an hour with full drawbar pull The average speed of the loaded train will be about 30 miles an hour. It can, of course, be run either forward or backward.

This locomotive is designed for heavy work, and will be called upon to handle trains as heavy as those now handled by the heaviest steam locomotives. A test of one of the completed trucks as shown reproducing one-half of the locomotive, was recently made upon the tracks at the Schenectady works of the construction company. In order to obtain the necessary load a New York Central heavy six-wheel engine was made use of and the electric locomotive truck was coupled to it. The machines were then sent in opposite directions and tugged at the connecting coupling as in a tug of war. The electric locomotive had a slight advantage over the steam engine in weight on the driving wheels, and pulled it up and down the track with apparent ease. For the same weight upon the drivers it was shown that the electric locomotive will start a greater load than the steam locomotive, the pull being constant throughout the entire revolution of the wheel, and the difficulty of variation of pull with the angle crank as in the steam locomotive being eliminated. The test also proved that not only were the motors sufficiently powerful, but that the driving mechanism and armature couplings were amply strong to transmit the torque of the armature to the axle.

The power-house is rapidly nearing completion and the generating machinery is almost ready for installation. The overhead apparatus which has been especially designed to meet the extraordinary requirements will shortly be in position, and before many months have passed the steam locomotive will be discarded for the operation of trains in the Belt Line tunnel, which, instead of being tarnished by smoke and soot, will be brilliantly lighted by incandescent lamps.

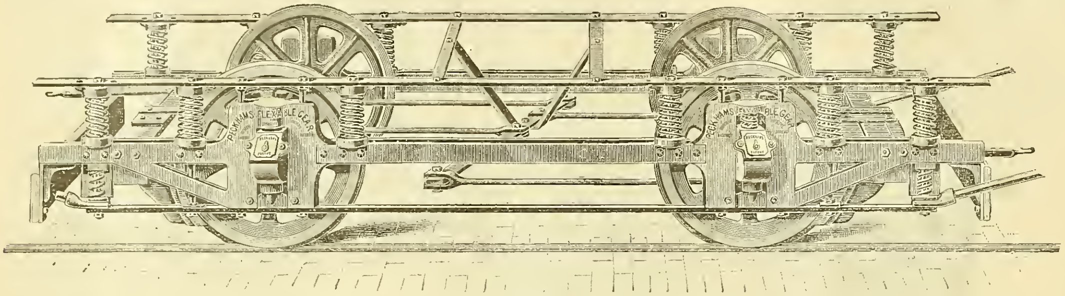


FIG. 1.—PECKHAM TRAILER TRUCK.

PECKHAM NEW EXCELSIOR TRUCK.

The new truck wheel the Peckham Motor Truck and Wheel Company is now placing upon the market was designed by the president, Mr. Peckham, to meet the requirements of certain roads that favor a cheaper construction than the company's all-steel, machine fitted trucks. The new Excelsior truck is constructed upon the same general principle as Peckham's cantilever extension truck. The pedestal and spring supports are cast in one piece and are secured by hot-driven rivets, no bolts being used in the construction. It is provided with a steel top frame connecting the different springs. It is so constructed that it can be used as a trailer truck, as shown in Fig. 1, or as a motor truck, with all spiral springs, as shown in Fig. 2, or as a motor truck, with both spiral and end elliptic springs, as shown in Fig. 3. The yokes are provided with Peckham's flexible gear, which supports the truck frame upon the journal boxes by graduated spiral springs; it is also provided with Peckham's dust-tight, self-lubricating journal boxes and with truss extensions for open cars, when so desired. Although somewhat lower in price than the company's all-steel, machine-fitted trucks, these trucks are made with the same degree of care as to details as is employed in the construction of all other Peckham trucks. These trucks are easy riding and strong and well made.

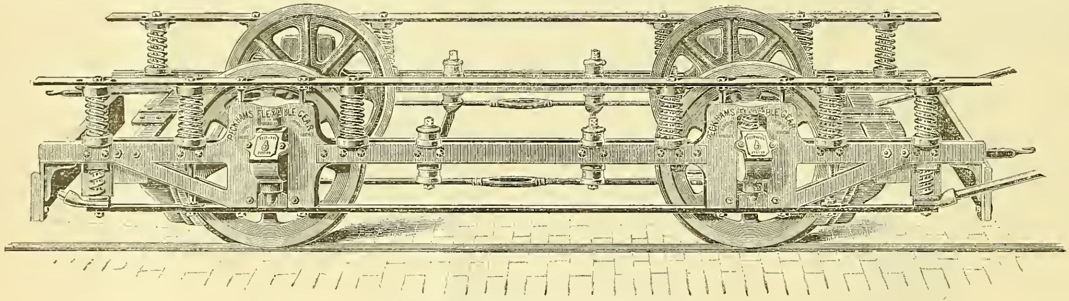


FIG. 2.—PECKHAM MOTOR TRUCK.

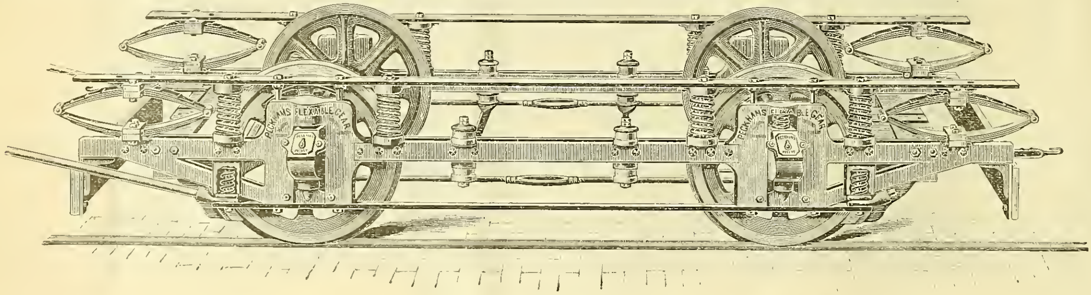


FIG. 3.—PECKHAM MOTOR TRUCK.

THE COMMERCIAL POSSIBILITIES OF ACCUMULATORS FOR TRAMCAR TRACTION, CONSIDERED AS A MUNICIPAL UNDERTAKING.*

BY ALFRED H. GIBBINGS.

PART II.

(*Concluded.*)

With regard to the electric lighting concern, the acquisition of a substantial day load is of the utmost possible consequence. For the purposes of this paper it will be better to assume that this department merely charges (as an electric lighting enterprise pure and simple) for the current which it can generate and sell. That is, I do not wish to complicate what I have to say by assuming any arrangement between the electric lighting and tramcar committees with regard to sharing the proportions of the costs under the various items common to both enterprises. It will be sufficient if we assume that:

1. The Electric Light Committee retain their independent position, and make a definite charge per unit for all current supplied.

2. That this output is merely considered as a day load.

The endeavor to solve the problem of a day load for the central station has resulted in the suggestion of many different methods, but most of these methods at the best would only make use of a very small proportion of the available power. In common with other central station engineers I have had the problem before me, and a few months ago I endeavored to show in a contribution to the *Electrical Review* (London) how far the various methods of charging the public for electricity from a central station tended in the direction of encouraging a day load.

In the course of my analysis in that article, under the heading of "The Works Cost," I dealt with the available horse power of a central station, and I cannot do better than read the paragraph: "Let us assume that the available horse power of a station is 1,000. Multiplying this by the total number of hours (8,760) in the year gives 8,760,000 H. P.-hours. Assuming, on the other hand, that the full capacity of the plant is used on the average three hours only per day, then the total number of actual horse power-hours equals 1,095,000, or one-eighth of the absolute capacity. As an assumption this errs, if anything, on the same side, as very few stations, in fact, are yet reaching the one-eighth of their full capacity in the year. We must now consider this unused available horse power side by side with those items of cost which would not practically be increased in the sum by generating seven-eighths available output.

"The items are as follows:

"1. Wages (except outdoor staff).

"2. Salaries.

"3. Repairs and maintenance.

"4. Rent, rates and taxes.

"5. Sinking fund.

"6. Interest on capital.

"It will readily be admitted that these are the expenses which really affect the cost per unit delivered to consumer. Yet these remain, to all intents and purposes, constant; practically, neither more nor less, even when the plant is being utilized to the full. The result, of course, is, that where the output is increased eight-fold, the rate of cost per unit delivered, so far as these items are concerned, will be reduced to one-eighth."

The remarks I have now quoted with regard to the methods of charging for current are equally true in reference to the arrangement which we are now considering. As an example, I will give actual figures from the working of the electric lighting station at Hull. These may be absolutely depended upon, as we weigh all coal, all ashes and measure everything consumed. The units generated and delivered are checked in four ways—first, by Aron meters in the circuit from the dynamo to the switchboard; second, by the working out of daily load curves taken from readings on the ammeters; third, by Edmondson meter in the main omnibus bars between the switchboard and the several feeders; fourth, by quarterly comparison of the consumers' meter readings. All these we find agree within a small percentage.

Our lightest weekly output during this summer cost us .97 pence per unit delivered (not generated), including coal at 14 shillings per ton, and oil, water, waste, and all stores. Our heaviest weekly output during this winter has cost us .60 pence per unit for the same items.

Now, with regard to the standing charges just referred to, if we multiply the heaviest weekly output by 52, or, in other words, if we assume the maximum weekly output as the average weekly output, I find that the proportionate cost of the standing charges comes to 1.84 pence per unit. Adding both these costs together—that is, the generating cost and the standing charges cost—we get:

Generating cost	.60d.
Standing charges cost	1.84d.
Total	2.44d.

as the representative total cost per unit for one week, and I have no need to add that I only wish the figures were true for every week in the year.

The maximum electrical power used during this model week was 450 for an average of three hours per day, or 9,450 E. H. P. hours out of a possible 75 600.

Now, a minimum number of small cars, say 30, averaging 10 E. H. P. each, would give (neglecting charging losses) 300 E. H. P., which for 90 hours in the week is equivalent to 27,000 E. H. P. hours, or an increased output of at least three times the usual quantity. As the power required by the tramcars would not vary with the season of the year, but would remain fairly constant, it is possible that this supply would form by far the largest factor of the output for some years.

You will at once see my object in giving you these figures. The generating cost, of course, will remain the same, viz., .60d., but the standing charges cost will be reduced to one-third, and the gross cost per unit becomes 1.21d. only for all current generated.

This figure gives us a very high efficiency—in fact, the very highest efficiency which has ever been obtained from any electric lighting central station in the United Kingdom, or, I venture to say, anywhere in the world. This demonstrates clearly what the co-operation of accumulator cars will do for an electric lighting station, and it may be definitely stated that the combination guarantees a better load factor for every week throughout the year than is obtained by the highest weekly output of the electric lighting alone. It would mean that an enormous profit would accrue to the electric lighting business itself, if only 3d. per unit were charged, and the first possibility which is immediately suggested is that of the great reduction which might be effected in the usual price per unit for current. But we must not forget that this possibility is essentially due to the creation of a magnificent day and night load. I am of opinion, therefore, that the standing charges rate should not be divided equally between the tramcar and the electric lighting concerns, but in the inverse ratio of their demand in units throughout the year. In thus charging the users of the electric light with the larger proportion of the standing costs, it would be possible to confer a still greater benefit on the traction enterprise by bringing the whole of its charges to within 1d. per unit. This price, which includes interest and sinking fund, capital, wages, and power, as far as the generating machinery is concerned, will be found to be a much lower figure than has ever been obtained with any system.

The foregoing arrangement does not necessitate that the traction accumulator cells should be charged at the electric lighting central station. The nearer the charging depot is to the central station, so much the better, in order to avoid loss in transmission and outlay in cables, but it is not an indispensable condition—a special set of cables could readily be laid to any convenient spot. The system of low tension supply will generally allow and admit of additional cables being easily laid to any point within the area of distribution.

You will have observed that the arrangement therein suggested is essentially based upon those facts of which we, as engineers, are certain. I have endeavored to entirely eliminate dubious or insufficiently tested possibilities, such as thermal storage, and I have avoided the unnecessary procedure of basing my proof upon comparisons of the working cost per car-mile of the different systems, as such figures are generally misleading, and in most cases do not form any proof at all. Admitting and including the heavy depreciation of the accumulator plates, it has been my object to show how accumulator traction can be worked cheaper and more satisfactorily than the other two systems. Hence my ideas are placed before you rather in the abstract than in the concrete. With reference to my figures representing the power obtainable from our refuse destructor—or, for that matter, from any other refuse destructor, providing the requisite quantity of refuse is present—I merely wish to point out that Mr. Jones, of Ealing, estimates for the same number of cells, destroying the same quantity of refuse as at Hull, a continuous power of 50 I. H. P., while I have placed my figures at 45 I. H. P. The refuse at Hull is, in fact, of a drier and more combustible nature than that at Ealing, so that my estimate may be taken as well within the mark. I have had the advantage of seeing the Ealing Destructor Works, and my assertions, therefore, may be taken with every degree of assurance.

I have now endeavored to point out or indicate in this paper a few features in connection with municipal enterprise, which are well worth consideration. I do not for a moment say that the particular instance I have given, and which I have found would be so particularly to our advantage at Hull, is one which in all respects would be found equally advantageous in other towns. But it is the co-operation of departments under municipal control which might be arranged without in any way interfering with the carrying out of the regular or specific work, which each department had been created to perform.

The tendency, of course, is already in this direction, and many towns are attempting to make some use out of the destruction of their refuse.

But there is no reason why such combinations should not be more extensively made, and to this end I have endeavored to show accumulators, as applied to electric traction, can at the present time be turned to remunerative account.

ELECTRIC TRACTION DISCUSSION.

The London Institution of Electrical Engineers, at its recent meeting, discussed the papers on Electric Traction, presented by H. D. Wilkinson and C. S. Du Riche Preller.* A synopsis of the discussion follows:

Holroyd Smith deplored the fact that Americans had failed to avail themselves as fully as they might have done of the conclusions resulting from experiments and study in Great Britain before rushing into unknown enterprises. The conclusions laid down by Mr. Wilkinson, as the expression of current American thought on tramway subjects, had long ago, the speaker said, been enunciated in England, viz., that storage batteries, as constructed at present, were too costly; that direct current tramways could be made to pay; that overhead conductors were cheap and not necessarily unsightly; that underground conduits were desirable in busy streets, and that the trolley wire was suitable for the suburbs of towns. Mr. Smith said that there was one feature of the overhead wire tramways that was decidedly American—the trolley pole—and was a decided improvement upon the little rolling or sliding carriage used by himself and adopted in the first overhead lines in America. He believed that Sprague was the originator of the device, and the thanks of the electrical world were due to him. The authors of both papers, he went on to say, had paid much attention to rail bonds and feeder wires, and the one to which he understood preference was given was very similar to the one he devised and employed in constructing the Blackpool line more than 10 years ago. For permanent way he had long advocated a double-tread rail and car wheels with a center flange, and he was glad to know the plan had been adopted at Buda-Pesth, which was decidedly the best example of an electric tramway with which he was acquainted.

H. F. Parshall, the American electrical engineer, said he had listened to the papers on American tramways with particular interest, because he was desirous to learn whether any features peculiar to American tramways have been observed.

He continued: Since the first commercial electric tramways were begun in the United States my time has been considerably occupied in designing apparatus for their use. The subject of earth returns has been touched on in all the papers. I may say in respect to this that the troubles now so common in the United States might have been avoided had these return circuits been put in according to principles that are thoroughly well understood. The extent to which the railways may be utilized as a return circuit depends on how well they are electrically connected together. Ordinarily fishplates are of no use in accomplishing this. The rail bond must carry the whole current from rail to rail. The contact between the bond and rail has been almost universally a pressure contact. Experience with polished copper pressure contacts is that a current density of 300 amperes per square inch for currents up to 500 amperes should not be exceeded. For greater currents so high a density is not permissible, since the contact surfaces cannot be fitted so well together. With iron contacts, especially when liable to corrosion, 50 amperes per square inch is as high as is safe in most cases. In other words, if 1,000 amperes per square inch is taken to be the mean current density permissible in the bonds, the contact should be 20 times the section of the bond. Supplementary conductors should be located so that the current density in the bonds is kept within this limit. In the case of very large currents the permanency of the earth circuits is best insured by electrically welding all the joints together. Mr. Wilkinson touched on the amount of power taken by electric tramcars—some further data may be appreciated. A fair value for the amount of energy taken by ordinary cars of from 8,000 to 10,000 pounds, making schedule time from 8 to 12 miles per hour, is one Board of Trade unit per car mile, corresponding to from 60 to 80 pounds of steam taken by high speed American non-condensing engines and belt driven dynamos used in small stations, or 35 to 40 pounds of steam taken by slow speed Corliss non-condensing direct connected plant used in large stations. The figures show how much can be gained where the fluctuations in the output can be lessened, so that the dynamos need not be driven by engines excessively large for the average amount of work to be done. The current taken in starting the car is from 40 to 50 amperes with the series parallel controller. This current corresponds to 1,600 to 2,000 pounds horizontal effort at the periphery of a 32-inch wheel, and accelerates the car under ordinary conditions about two feet per second. The energy taken per car-mile remains fairly constant through a wide range of speed, which points to the economy of as high tramway speeds as safety permits. The practice in the United States of running the cars at from four to six miles per hour in the crowded streets and 12 to 15 miles per hour in the outskirts, seems to the speaker to be reasonable, since accidents generally occur in the slow-speed districts. I submit herewith curves showing the speed, torque and efficiency (including loss in gearing) of a good modern American tramway motor designed for series parallel control. If this motor were adjusted to English practice the torque would be increased 50 per cent., and the starting current for the same conditions diminished to two-thirds of that quoted above for American practice. Regarding the application of alternating currents to tramways, I may say the properties of the induction motor are not such that it may compare favorably with continuous current motors for ordinary tramway work. I submit herewith for your consideration a torque curve of a well designed three-phase induction motor, which should be compared, as to form, with the torque curves of the continuous current motors before me. The indirect application of alternating currents to drive commutating dynamos for the operation of tramways is being successfully carried out, and has the advantages of avoiding long earth returns and heavy feeders. Regarding the experience in the United States with direct connected railway dynamos, I may say briefly the results have been most gratifying. No mechanical troubles have been experienced either with dynamos or engines, and the safety and economy gained are even more marked than on direct connected lighting dynamos. As an example of the service such plant has been put to, I may quote the Intramural road at the Chicago Exhibition. There were 14 trains of 67 tons each. Scheduled time, including stops, 10 miles per hour, each train taking on an average 42 KW., but frequently more than 250 KW., so that the fluctuation of load on the 750 KW., 100 revolutions engine and dynamo, was regularly between 400 and 1,500 KW. This, together with occasional short-circuits, threw on the plant great strains; still there was no trouble from any source, and after the apparatus was taken apart at the end of the exposition, it was found to be in perfect condition.

Dr. N. S. Keith, another American engineer, gave a description of a line in California that ascends 1,600 feet in 3,000 feet. This is the Pasadena & Mount Wilson Railroad, in South California. It would, he said, be eventually carried to the top of Mount Wilson, 13 to 15 miles distant from Pasadena. It now ended at the top of Echo Mountain, 3,500 feet above Pasadena. The ascent was made by a 75 H. P. Keith electric motor, placed on the summit of the rise. The power was obtained partly from gas engines and partly from Pelton wheels, but it was contemplated eventually to derive a quantity of water from the other side of Mount Wilson. This water would be pumped up 400 feet to carry it over the summit, when it would have a possible fall of 7,000 feet. The pumping would be done by electric power generated by the fall.

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* See STREET RAILWAY GAZETTE, November 24 and December 22, 1894.

Major-General Webber spoke of the interest now taken in England in light railways. He did not know how the electrical engineer was to provide a locomotive to draw those trains economically, unless the locomotive trolley was going to carry its own power. It seemed to him that it would never pay to put up a traction station, an electric generating station, for a line costing £2,000 a mile, or to maintain a generating station in use for storage, for the purpose of running two or three trains a day. But he could not help thinking that there they had a future for traction by storage, and it was a point which, he believed, if studied and carefully thought out and the experience they had already gained applied—he did not think it had been at all fully applied as yet in that direction—they would further this great object of being able to run trains for agricultural purposes through sparsely populated districts. If they were going to bring the produce of the country cheaply from the points of production to the markets, it had occurred to him that here was a favorable opening for the use of electric locomotives carrying storage batteries. He had nothing to suggest more than this: that the very small experience which, they had had in this country should not leave them hopeless on this point, that traction by storage was a thing that might now be looked to for further developments, and that there was a useful and profitable field in that direction if their engineers would only turn their attention that way.

Dr. S. P. Thompson said he was one of those who had had the advantage of seeing what had been done on the other side of the Atlantic. He remembered very well, going over last autumn, from his previous visit of nine years before, what an unpleasant effect was produced on the mind of the average Britisher by seeing all the arrangements of overhead wires and cables that at that time somewhat disgraced some of the American cities; and when he knew that he had to see something that had sprung up in those nine years—the trolley work, the overhead wires, the networks which had sprung up in connection with tramcars—he expected that his feelings of disgust of nine years ago at the fashion in which wires were strung overhead everywhere in a reckless way, and in every direction, would return with some intensity. But he must say that he came home with very different ideas, because the Americans had mended their ways a great deal in regard to overhead lines. They did not have quite the unsightly arrangement of telephone wires of nine years before, the electric light wires were very much improved and in many cases were laid underground; and, as one who objected very much to all these networks of wires, he came back with this strong impression: that of all the different kinds of overhead wires one might see, whether in America or in this country. the overhead construction which least disfigured the landscape, was least of an eyesore of all, was the construction of overhead wires for modern tramway work. Having made that statement, he would like to say that he thought not even American cousins had entirely realized the importance of what they had done in constructing so many thousands of miles of light rails carrying electric tramcars from the centers of population and industry away into the surrounding districts. He meant, they had not realized the importance of this thing to themselves as a social factor. Any one who visited, for example, Pittsburgh now, and who knew what Pittsburgh was ten years ago, would see that already the rapid transit from the center of a thickly populated town to the outlying regions had had a distinct social effect. The workmen, instead of crowding into barracks and tenements in a densely populated street, to a very much larger extent lived in little villas each in its own little plot of ground, two or three miles from the center, where life was more healthy and children much happier, thus returning to the more primitive civilization of the village, instead of to the more desperate civilization of the populous town, and this, thanks largely to the fact that rapid transit was possible by means of electricity. Several other facts struck him in the social bearing of rapid electrical traction, and notably this: that a great part of the lines that were spreading out from town to town and from village to village across the State of New Jersey had been built—at whose expense? By money found, he was told, very largely from two sources—the insurance companies of New York and Philadelphia and the Pennsylvania Railroad. Now, those two facts were very striking. If there was one body that looked out for a sound sort of investment, he supposed it was an insurance company: and if there were any investments that were entitled to respect they were the investments of a railway company. Why should it pay any company like the Pennsylvania Railroad to promote tramcar transit by means of electricity? Simply because of this—and the great railway companies in England would find it out: that it was a distinct gain to the management of a railroad to clear out the local traffic as much as possible, and allow the through traffic freer course. He believed they should find this an important factor in England, that if they could have electric lines running out from terminus stations a few miles into the country and feeding the terminus stations, it would greatly lighten the main traffic. There were many lines no doubt in England, small branch lines off the main lines, which at present were worked at a great disadvantage often by the large companies—small lines built as a speculation, then taken over by a larger company, which at present did not pay by steam traction, but which would pay by electric traction—because, where it would not pay to run two or three long trains, it might pay very well to send one car an hour or every half-hour by electric means. Here another social question came in. Civilization should be improved and aided by these new means of traffic in the same way as steam traction had aided it as against the more primitive methods of traveling. This raised, however, another question, whether it was not advisable, having a well-recognized gauge for railways, and well-recognized style for rolling stock, in all future schemes to consider a common gauge for electric tramways capable of running on the rails of the heavy railways of this country. That was of course a very large question, but it would be a great disaster if we did not consider it now in all its bearings. We did not want perpetuated in electric traction the same kind of miserable mistake as was made when the battle of the broad and narrow gauges was fought out on the existing railways.

Mr. Carruthers Wain, president of the Tramways Institute, said his experience with storage batteries had not been that overwhelming success they had all hoped for, and no doubt the blame for that to some extent rested on a variety of shoulders. It was due—and he said it frankly and unhesitatingly—the failure of storage batteries in England was due to a variety of causes, and not necessarily to the batteries themselves. For example, when they asked an accumulator car to grind its way through snow and ice over a line 1¼ inch wide to gauge, what could they expect but the exceedingly rapid deterioration of those batteries? And, furthermore, he would ask if batteries were allowed to wear out and were not replaced, and they charged them every journey, every six miles, what could they expect but that their working expenses would mount up to an alarming proportion, and therefore, by the ignorant and prejudiced, traction by storage batteries be regarded as a failure? He was trying to find out the best form of traction. With that object he had experimented, he was going to say, with air, fire and water. He had used steam by means of locomotives traveling on common roads; he had tried compressed air; he had tried, and was trying, oil; he had tried, and was trying, gas; he had tried accumulators of all types, the E. P. S., the Epstein and the Jarman, on different roads; and he had tried the overhead-wire system. He mentioned he intended to try the Theryc-Oblasser batteries in Birmingham.

FINANCIAL NOTES.

The Lancaster Traction Company.—The annual report of the Lancaster Traction Company shows that during the year 1,186,612 passengers were carried and that the total revenue was $83,898.

Elgin, Ill.—The report of M. H. Thompson, assignee of the Dundee Rapid Transit Company, gives the liabilities at $23,000, and the assets as $20,000. A committee has been appointed to form a plan of settlement.

Nashville Bonds.—The stockholders of the reorganized Nashville Street Railway Company have authorized the issuance of $2,000,000 bonds to redeem underlying bonds and to provide for necessary improvements.

Reported Sale of the Long Island City Railway.—It has been reported that ex-Mayor Gleason has sold his interest in the Long Island City & Newtown Railroad Company, of Long Island City, N. Y., to the Steinway Railway Company for $275,000.

Baltimore Traction Negotiations.—It is reported that negotiations are pending for securing control of the Lake Roland Elevated Railway for the Baltimore Traction Company. The alleged deal is to be consummated, it is said, by the purchase of the Lake Roland stock owned by the Jarvis-Conklin Company.

Consolidated Traction Company.—The stockholders of the Consolidated Traction Company of New Jersey have elected the following additional directors; P. A. B Widener, Thomas Dolan, W. L. Elkins, A. J. Cassatt and C. A. Griscom, of Philadelphia; John D. Crimmins, of New York; and A. Garrettson, of Jersey City.

Receiver Appointed in Portland.—O. F. Paxton has been appointed receiver of the Portland Consolidated Street Railway Company. The company has operated 32 miles of track and owns 74 motor cars. The capital stock is $1,000,000, of which $525,000 has been issued. The company has issued $407,000 mortgage bonds. Last year its receipts from passenger traffic were $248,328.

Fond du Lac Sale.—The property of the Fond du Lac Light, Power and Railway Company, valued at $100,000, was sold at auction last week by the sheriff for $4,678 to Elihu Colman. That sum was sufficient to satisfy judgments of foreclosure of four liens on the company's power-house and equipment. It is said the purchase was made for the First National Bank of Chicago.

General Electric Bonds.—It is not impossible that the General Electric Company may increase its investment in General Electric bonds beyond the $1,000,000 already purchased and in its treasury. The company has still a rising cash balance now amounting to $600,000, and is putting its bond interest money aside every month. The gross output of apparatus is above $1,000,000 per month.—*Boston News Bureau.*

Suit Against the Trenton Company.—The Trenton Banking Company last week began a suit against the Trenton Passenger Railway Company. Col. Lewis Perrine, president, and Samuel K. Wilson, vice-president, to secure the payment of a note of $18,000, made by the company and indorsed by by those two officers. The First National Bank started a suit some days ago against the same corporation for a note of a similar amount.

Receiver for the Muskegon Railway.—Fred A. Nims has been appointed receiver of the Muskegon (Mich.) Railway Company in $10,000 bonds. Mr. Nims is the president of the company. The road will be operated pending further order of court. There are 11 miles of road and the indebtedness reaches about $250,000. The cause of the trouble was a default in meeting the interest and fall taxes, and a falling off in patronage. The suit for the foreclosure of the mortgage was begun by William F. Dummer, vice-president of the Northwestern National Bank, Chicago, who represents the second mortgage bondholders.

Pennsylvania Traction Company.—The report of the operations of the Pennsylvania Traction Company for the year ended June 30 last has been filed with the Secretary of Internal Affairs of Pennsylvania. The total capital stock of this corporation is $10.000,000, of which 9.000 shares have been issued on contract for property purchased. The report shows liabilities of $11,429,850, including an issue of $1,114,500 in bonds and unfunded debt of $415,350. The assets are $11.427,090.79, leaving a cash balance of $2,759.21. From Feb. 5, 1894, when the Lancaster Traction Company's line was secured, until June 30, a total of 784,557 passengers were carried. These passengers paid $55,576.03. The total number of passengers carried by both corporations during the fiscal year was 1,971,199, and the total amount of fares received $135,518.16.

Lake Street Elevated Coupons Paid on Conditions.—When the coupons, maturing January 1, on the bonds of the Lake Street Elevated Railroad Company, Chicago, were presented for payment they were redeemed under certain conditions. When holders went to the American Trust and Savings Bank for their money, the following circular was handed to them: "Please take notice that the coupons of the bonds maturing this day of the Lake Street Elevated Railroad Company are taken up by the undersigned, the American Trust and Savings Bank, trustee, expressly under the following conditions: The Lake Street Elevated Railroad Company, on December 28th, 1894, deposited certain moneys with this bank to meet said interest coupons due January 1st, 1895. Other parties now insist that those moneys belong to them, and that said moneys should be applied not toward the payment, but only toward the purchase for them of said coupons. If it be hereafter judicially determined that their position is correct, then the said coupons so maturing Jan. 1, 1895, and taken up by this bank, will be turned over to them as purchasers thereof, uncanceled by said bank. Unless you consent to the conditions of this notice, the undersigned must decline to take up said coupons." If the coupon holder signed the agreement which was appended he received his money, otherwise not.

Trenton System in New Hands.—The entire passenger railway system of Trenton, under the deal effected on Saturday, practically passes under the management of Philadelphians. Syndicates, in which Philadelphia capitalists have the largest interest, says the Philadelphia *Public Ledger*, already control the principal street railways in many of the large cities east of the Mississippi River, and the acquisition of the Trenton lines by a syndicate, composed chiefly of Philadelphians, adds another city to the list. Thomas C. Barr, of Newark, who was elected president of the company on Saturday, went to Newark about five years ago, and is now interested largely in passenger railways in that city. Mr. Barr was at one time president of the People's Passenger Railway Company, of this city. Though he now lives in Newark, he is frequently in Philadelphia, and Philadelphians have always been associated with him in the management of the Newark lines. Mr. Barr will fill the office of president of the Trenton Passenger Railway Company temporarily. Henry C. Moore, now president of the People's Passenger Railway Company of this city, who has been elected general manager of the Trenton company, will also become president when he retires from his position here. Mr. Moore has not yet presented his resignation to the board of directors of the People's company, but he has notified them of his intention to retire. He will probably remain at the head of the People's company until after the annual meeting, which takes place on the 8th inst.

Allentown Traction Finances.—The stockholders of the Allentown & Lehigh Valley Traction Company have voted the propositions to increase the debt from $750,000 to $2,000,000, and the capital stock from $1,500,000 to $4,000,000. The object of this increase of debt and capital is to wipe out all the present floating and bonded indebtedness of the traction and transit roads, to take up the minority stock of the latter road, and to consolidate the two lines. This will be effected as soon as possible, and the whole system will then be known as the Allentown & Lehigh Valley Traction Company. A general mortgage of $2,000,000 to cover both lines will be negotiated and bonds will be issued for that amount. One object of the increase of the debt is to pay off a mortgage of $750,000 on the Traction road, held by the Union Trust Company of New York, in trust for the bondholders, the principal holder of which is R. T. Wilson, of New York. The balance of $350,000 that will be left after the mortgage on the Traction and the Transit companies and the floating debt of the latter are paid, will be applied to some important improvements that are in contemplation. The increase of the capital stock from $1,500,000 to $4,000,000 is intended in the first place to call in the bonds, which, by law, does not allow any corporation to make a debt of more than half the amount of its capital stock; and, in the second place, for the purpose of taking up the 3,000 shares of Rapid Transit stock held by residents of Allentown and Catasauqua, and which the Traction company did not buy last spring.

NEW INCORPORATIONS.

Chicago, Ill.—The Chicago and Worth Street Railway Company has been incorporated with a capital stock of $2,000,000. The promoters are W. W. Beaty, J. H. Smith, M. Skinner.

Camden, N. J.—The Burlington & Mt. Holly Traction Railroad Company has been incorporated; capital stock $100,000; promoters, Samuel Rea, Bryn Mawr, Pa.; Henry D. Welsh, Philadelphia; W. J. Sewell, Camden, N. J.

Grand View, N. Y.—The River & Valley Traction Company has been incorporated, with a capital stock of $3,000, to build and operate a street surface road in Nyack. The promoters are D. C. McMillan, Piermont, N. Y.; C. S. Quidor, J. W. Dalley, of Nyack, N. Y.

Flushing, N. Y.—The Flushing and College Point Electric Railway Company has been incorporated with a capital stock of $125,000; business to be prosecuted, to build and operate a street surface road in Queens County, N. Y. The promoters are P. D. Cravath, Daniel O'Dell, E. B. Halstead, New York, N. Y.

New Brighton, N. Y.—The Staten Island Interior Railroad has been incorporated with a capital stock of $300,000; business to be prosecuted, to build and operate a street surface road in Richmond County, 15 miles long. The promoters are Herman Bergholtz, DeF. Van Vleet, F. C. Cornell, of Ithaca, N. Y.

Columbia, Pa.—The Keystone Traction Company has been incorporated, with a capital stock of $20,000. The incorporators are John J. Patterson, William B. Given, John B. Skiles, J. W. B. Bausman and Michael Reilly. It has been announced that the purpose of the company is to build an electric road between Philadelphia and West Chester.

Union, Ore.—The Union Street and Suburban Railway has been incorporated, the capital stock is $20,000, and the company proposes to purchase the road, buy rolling stock, right of way, supplies, etc., and all the appurtenances of the railroad heretofore owned by the Union Railway. The promoters are J. H. Hutchioson, W. R. Hutchinson and Jas. Raymond, of Union, Ore.

Nyack, N. Y.—The Nyack Traction Company, with a capital stock of $50,000, has been incorporated. The projectors are B. B. Odell, Jr., who is president of the Newburg trolley line, and Ferdinand B. Bain, builder of the Poughkeepsie lines. Judge A. S. Tompkins, of Rockland county, is one of the directors. This company proposes to build a trolley from the steamboat dock at Nyack to the West Shore depot at West Nyack. A number of Nyack business men have formed the River and Valley Traction Company. Among the directors are Harrison Bailey, Liddock Brothers, C. Quidder, Ernest Brothers and John D. Blauvelt. This company proposes to build a line over the same route as the Odell company. The two companies are now arranging for the right of way and a franchise.

NEWS OF THE WEEK.

Omaha, Neb.—Negotiations have been in progress for the use of the several trolley lines for transporting the mail.

Indianapolis, Ind.—The Citizens' Street Railway Company has adopted the rule of stopping its cars at the near crossing.

Corning, N. Y.—The Common Council has granted a franchise to the Corning & Painted Post Street Railway Company.

Brooklyn, N. Y.—While the volunteer firemen of Bath Beach were going to a fire last week, the hose wagon collided with a West End trolley car, and two of the firemen were injured.

New York, N. Y.—Mayor Gilroy last week vetoed the ordinance giving the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad Company a franchise to construct a road through Eighty-sixth street, from Central Park to Tenth avenue.

Indianapolis, Ind.—Ground has been broken for the West Washington street power-house. The building will have a frontage of 66 feet, and will be 55 feet in depth. It will be a two-story structure, and all the offices of the company will be located in the building.

Chicago, Ill.—In the condemnation suit of the Metropolitan West Side Elevated Railroad Company against Allen C. Yunt and a score of other property owners, the jury awarded damages aggregating $19,486.33. Several of the property owners have asked for a new trial.

Philadelphia, Pa.—The Philadelphia Traction Company is to put on six new lines of trolley this winter. They include the Continental, Columbia avenue, Spring Garden and Wallace streets and York and Dorphin streets, two West Philadelphia branches and a new road.

Venice, Ill.—The village board of Brooklyn has granted a franchise to F. M. Jenks, Henry Schroeder and Ferd. Meyer for the construction of a street railway on Second, Fifth and Canal streets. The road is to connect with Venice and East St. Louis, and is to be commenced within 90 days, and completed within two years.

Chicago, Ill.—A report has been filed in the City Department of Statistics of the number of men now in the employ of the North Chicago Street Railway Company. The total is 1,591, distributed as follows: Office, 62; stations, 94; barns, 200; trackmen and laborers, 216; conductors, drivers and gripmen, 812; shops, 103; electricians, 104. In the employ of the West Side Company are 3,100 men.

Chicago, Ill.—The law department, in an opinion prepared by Assistant Corporation Counsel Barton, declares that the city has a right to compel all street car companies to issue transfers from any one to any other car controlled by any one of the companies. The opinion goes further and declares that it might possibly be within the power of the city to compel one company to issue transfers to the cars of another company.

Philadelphia, Pa.—The Philadelphia Traction Company will abandon the cable power-station on Sansom street, below Ninth, when the trolley cars are put in operation on the Seventh and Ninth streets and Columbia avenue cable roads. The power will be supplied by the power-station at Thirteenth and Mt. Vernon streets. Before the opening of spring the company expects to be able to substitute trolleys for the cable cars on this road.

Oakland, Cal.—A car on the electric line between Alameda and Oakland plunged through the open draw at the Webster street bridge into the waters of Oakland creek a few days ago. The draw was open and the motorman did not heed the signals. The conductor and motorman were the only persons on the car. They did not have even time enough to jump, but went down into the water with the car. They escaped with no serious injury.

Chicago, Ill.—It is announced that the West Chicago Street Railroad Company is planning to bring its Lake street trolley line down Lake street under the elevated railway tracks to State street and on State street south to Randolph. All the electric surface lines that will compete directly with the Metropolitan Elevated would use this route to reach the down-town district. It is said the necessary consents of property owners have already been obtained.

Philadelphia, Pa.—The dispute between the Western Union Telegraph Company and the management of the Old York road branch of the People's Traction Company over the alleged interference of the trolley poles with the telegraph wires, which was taken into the courts, has, it is stated, been amicably settled and legal proceedings have been dropped. It is expected that the Old York road line will be put in operation to Jenkintown some time the present month.

Kansas City, Mo.—The County Court has granted a franchise to the Westport & Waldo Railway Company to build a double-track electric street railway beginning at Thirty-ninth and Cherry streets, running east on Thirty-ninth to Holmes street, north on Holmes to Springfield avenue and east on Springfield avenue to Brooklyn avenue. By the terms of the franchise work must be begun on the line within six months and the road must be finished within 12 months. The franchise is for a period of 35 years.

Bucyrus, O.—Messrs. Pearl and Hussey, of Pittsburgh, recently held a conference with the local stockholders of the Bucyrus & Galion Interurban Electric Railway Company. It is announced that they arrived at an agreement whereby work will be commenced on the road by May 1. The line will be about 13 miles in length with a power-house midway between Bucyrus and Galion. A park, for public amusement, will also be located somewhere near the center of the proposed line. The estimated cost is placed at $160,000.

Indianapolis, Ind.—An appeal has been taken in the case of the City Railway Company against The Citizens Street Railway Company, involving the right of the latter to a franchise in the streets of the city. Judge Woods, of the U. S. Circuit Court, decided in favor of the latter. The bill of error is a somewhat lengthy document and sets out many technical reasons for the granting of the appeal. The chief error assigned is that as the case is one between two citizens of the same State and as no Federal question is involved the United States Circuit Court has no jurisdiction in the case

Philadelphia, Pa.—Active operations on the Fairmount Park trolley line, it is stated, are to begin as soon after the specifications are approved as the weather will permit. The West Park portion of the road will be running, it is thought, about July 1. A full equipment of open cars is to be provided and as many closed cars as seem necessary. The cars will probably be 30 feet or more long, and they will be mounted on double trucks. It is generally believed that members of the Philadelphia Traction syndicate will take most of the stock of the new Fairmount Park Transportation Company, which is to construct and operate the road. The license to build the road, given by the Park Commission, provides that all passenger railway companies shall be treated equally in the matter of transfers.

PERSONALS.

Mr. J. W. Marsh, vice-president of the Standard Underground Cable Company, of Pittsburgh, was a New York visitor this week.

Mr. Henry C. Moore, president of the People's Passenger Railway Company, will resign, it is announced, to become general manager of the Trenton Passenger Railway Company, a controlling interest of whose stock has been secured by a syndicate, which includes several Philadelphians.

Mr. B. W. Wrenn, formerly general passenger agent of the East Tennessee, Virginia & Georgia Railway and the Memphis & Charleston Railway, has been appointed passenger traffic manager of the entire system of the Plant Railway and Steamship lines. Mr. Wrenn is a railroad man of long experience, is possessed of unusual executive ability, and his energy and experience will undoubtedly prove of great value in the important connection he has just made.

TRADE NOTES.

The Watertown Engine Company, of Watertown, N. Y., has issued a miniature catalogue illustrating its engines and containing opinions of those who have used the engines.

The Berlin Iron Bridge Company, of East Berlin, Conn., is building a new power-house for the Sing Sing Electric Light Company, at Sing Sing, N. Y. The building is 50 feet wide and 100 feet long, the roof being covered with the Bridge Company's patent anti-condensation corrugated iron. The New England Pin Company, at Winstead, Conn., has placed a contract for the bridge connecting the two departments of its works with the Berlin Iron Bridge Company.

Business of the Peckham Motor Truck & Wheel Company.—The Peckham Motor Truck & Wheel Company's business during 1894 showed a decided increase over that of the preceding year. The company found no difficulty in running its works at full capacity during the entire year, showing the increased demand for Peckham's trucks as they become better known by street railway companies. More than 2,000 of the Peckham trucks are now in use on the cable and electric roads in New York City, Brooklyn, Jersey City, Hoboken and Philadelphia, where they have been adopted as standard after a thorough trial. Among these t0 roads on which the Peckham trucks have been adopted as standard, may be mentioned the Atlantic Avenue road in Brooklyn, the Consolidated Traction Company's lines in Jersey City, the People's Traction lines in Philadelphia, and the Metropolitan Street Railway Company's lines in New York City. The Peckham Company has brought out during the year its new "Excelsior" trucks, including the "Trailer" truck, designed especially for "trailer" cars; the "Spiral Spring" extension truck, designed for 16 feet closed or 26 feet open cars; the "Elliptic Spring" extension truck, designed for the same size cars as the "Spiral Spring" truck, and also their No. 10 "Swivel" truck for long cars. The chief feature of the company's work during the past year, however, has been the care given to the small details of construction. Many improvements have been made where the varying requirements of street railway service indicated that changes or improvements were desirable. The main design of the Peckham truck has not been changed, as this has been found to be entirely satisfactory. During the year 1895 other new features will be added where they may be found to be desirable; and judging from the present prospects, the Peckham truck will be adopted during the year by a large number of electric railways as their standard.

RECORD OF STREET RAILWAY PATENTS.

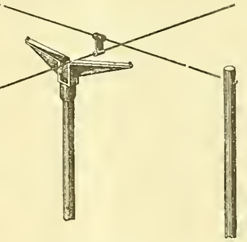
U. S. Patents Issued Dec. 25, 1894.

531,331. Trolley. Charles E. Powell, Philadelphia, Pa. Filed Oct. 31, 1894. This trolley rod for use on overhead electric railway systems has a bracket at its upper ends, in which is mounted a roller, and which is provided with a fender, consisting of two integrally formed outwardly projecting arms one on each side of the roller. The arms have inclined upper faces, and pins projecting from their outer ends. (See illustration.)

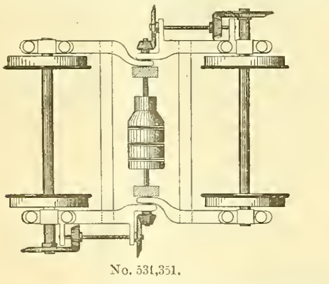
531,351. Flexible Gear for Electric Car Trucks. Ferdinand A. Wessel and Ernst Egger, New York, N. Y., Assignors of one-fourth to Aaron Naumburg, same place. Filed Sept. 22, 1893. There is a pair of levers rotary around each axle and around the shaft, and connecting the same. There are bevel gear wheels at the ends of the armature shaft and upon the axles, and intermediate shafts having bevel gear wheels which engage with the first named gear wheels, and which have their bearings rigidly fixed on the levers. (See illustration.)

531,354. Electric Conductor Support; Johan M. Anderson, Boston, Mass., Assignor of one-half to Albert Anderson, same place. Filed July 9, 1894. The support for electric conductors comprises side walls forming a groove for the reception of the conductor and having its bottom provided with nubs or projections forming between them a recess or depression in the bottom of the groove. A clamping device co-operates with the nubs to crimp or bend the electric conductor into the depression.

531,366. Means for Controlling Electric Locomotives; Ernst Egger and Ferdinand A. Wessel, New York, N. Y., Assignors of one-fourth to Aaron Naumburg, same place. Filed May 17, 1893. There are conical pulleys on the motor axle and car axle respectively and connected by a driving belt. A belt shifter is movable along the direction of the length of the pulleys, and means are provided for automatically tightening the taut and loose portions of the belt as the load increases. (See illustration.)


No. 531,331.

531,373. Signal Bell; Irad L. Garside, Paterson, N. J., Assignor to the Multi-Stroke Bell Company, of New Jersey. Filed May 15, 1894. The patent covers a shaft mounted and turning in a frame, a friction roller carried on the shaft, a rotary striker or strikers mounted upon the shaft, and means for rotating the frame to cause the roller to make contact with the wheel for which it is designed.


No. 531,351.

531,371. Car Fender; William B. George, Columbus, O. Filed Oct. 12, 1894. (No model.) The dashboard is made with a compartment into which a fender is adapted to enter, springs being provided for projecting the fender. These instrumentalities are utilized: A vertical shaft, a cord or chain secured to the fender and wound on the shaft, a perforated plate secured to the shaft, a dog pivoted to the dashboard and adapted to enter a perforation in the plate, and a crank on the shaft.

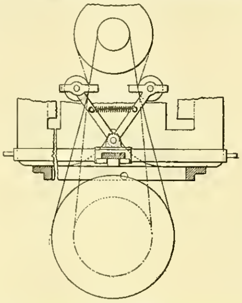
531,380. Trolley Catcher; Peter D. Milloy, Buffalo, N. Y. Filed April 2, 1894. The trolley catcher consists of a cylindrical barrel having a weight and a compression spring acting conjointly to draw down the rope when the bolts are released.

531,383. Trolley; George A. Newhouse, New Albany, Ind. Filed July 28, 1894. The trolley comprises a pole, a fork, and connections between the fork and pole included within the limits thereof, and tending to maintain the fork and pole in their normal relations while permitting an oscillating movement of the fork.

531,391. Life-Guard for Cars; Jakob Schneider New York, N. Y. Filed July 11, 1894. A cradle is adapted to be thrown forward and downward, means being provided for throwing the same. A pivoted catch-lever engages directly with the rear crossbar of the cradle to hold it in its elevated position, and there are means for holding the cradle in its forward position.

531,395 Car Fender; Alonzo D. Smith, Newark, N. J. Filed Sept. 8, 1894. The fender comprises frame portions and spring plates extending from these portions, the plates being U-shaped and spirally wound, and means for securing the fender to a car.

531,406. Commutator; Henry L. Bridgman, Blue Island, Ill. Filed July 3, 1894. This is a commutator comprising an insulating frame having flanges affording pockets, with an electro-deposited filling of metal in the pockets, affording the conducting portion of the commutator.


No. 531,366.

531,407. Entrance-Guard for Open Cars; John A. Brill, Philadelphia, Pa. Filed Oct. 12, 1894. A guard extends along the posts, steps extending between the posts and the bars to support the guard, and a hinged latch sustains the guard in an elevated position.

531,418. Car-brake; Samuel S. Leonard, Cleveland, O. Filed Feb. 3, 1894. Two brake bands are fixed at their remote ends to suitable supports adjacent to the wheels respectively, and extend from the fixed points over and partly around the wheels. Two levers pivoted to fixed points connect with the movable ends of the brake bands respectively. A rock shaft has an arm secured thereto, and links connect said arm with the two levers, there being mechanism for operating the rock shaft. (See illustration.)

531,423. Insulator; Louis McCarthy, Boston, Mass. Filed Nov. 19, 1894. The insulator comprises a case having holes or perforations therethrough with one or more connections within the case. There is insulating material adjacent to the connection or connections, and a mass of insulating composition is applied exteriorly to the said case, interiorly thereof around the said connection or connections, and extending through the said holes or perforations aforesaid.

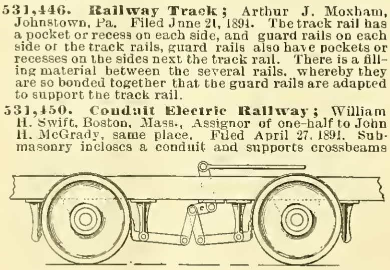
531,437. Trolley-wire Bracket; Winfield S. Kline, Bolivar, and John B. Westhafer, New Philadelphia, O. Filed Oct. 17, 1894. There is an arm having adjustably attached thereto clips, a spring, and a hinged arm.

531,441. Electric Railway; Charles H. Macloskie, Schenectady, and Henry M. Brinckerhoff, Matteawan, Assignors to the General Electric Company, Schenectady, N. Y. Filed May 17, 1894. A contact shoe is vertically suspended on an insulating support of a swiveling truck by means of linked connections permitting the contact shoe to automatically adjust itself in the reverse movement of the car to trail in either direction.

531,445. Electrical Connection for Railway Rails; Arthur J. Moxham, Johnstown, Pa. Filed June 2, 1894. Cross current conductors connect the several rails together electrically, the conductors having a portion or portions formed flexible and having their ends integrally united to the track rails. (See illustration.)

531,446. Railway Track; Arthur J. Moxham, Johnstown, Pa. Filed June 21, 1894. The track rail has a pocket or recess on each side, and guard rails on each side of the track rails, guard rails also have pockets or recesses on the sides next the track rail. There is a filling material between the several rails, whereby they are so bonded together that the guard rails are adapted to support the track rail.

531,450. Conduit Electric Railway; William H. Swift, Boston, Mass., Assignor of one-half to John H. McGrady, same place. Filed April 27, 1894. Sub-masonry incloses a conduit and supports crossbeams which extend across the conduit. Castings form the entrance slot for the trolley, supported on the sub-masonry and crossbeams and secured to the latter, the castings having inward extending knee braces resting on the crossbeams.

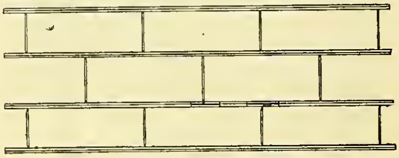

No. 531,418.

531,499. Electric Locomotive for Elevated Railways; Fritz B. Behr, London, England. Filed Feb. 27, 1894. Patented in England, July 19, 1893, No. 13,996; in France, Aug. 17, 1893, No. 232,301; in Belgium, Feb. 5, 1894, No 108,409; in Switzerland, Feb. 7, 1894, No. 8,038; in Hungary, March 2, 1894, No. 327; in Italy, March 12, 1894, LXX, 155; in Austria, March 15, 1894, No. 44/480; and in Austro-Hungary, March 21, 1894, No. 47,158 and No. 9,815. This patent covers in a single line elevated railway, the combination with a passenger vehicle and two parallel guide rails of a pair of bell cranks pivoted to each of the opposite sides of the vehicle, each pair being connected by a rod pivoted to one of the cranks, and loosely passing through an eye in the other crank. A spring is interposed between the latter crank and a nut on the end of the crank, and guide wheels are journaled in the free ends of the cranks and bearing against the guide rails. (See illustration.)

531,550. Car-Brake; Russell W. McKee, Clifton, N. J. Filed Feb. 7, 1894. In a truck provided with curved guideways, shoes are provided with pins working in the guideways, springs being secured to the shoes and to the truck frame. Bell cranks arranged above the shoes have one arm engaging the shoes, and the other adapted to be connected with an operating lever.

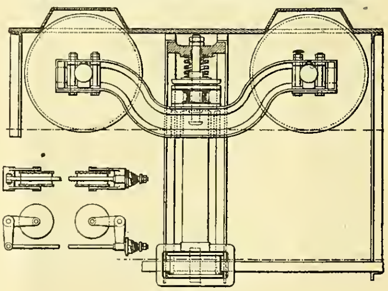
531,575. Truck for Electric Cars; William Sutton, St. Louis, Mo. Filed Feb. 19, 1894. This is the combination of the traction driving wheels, the pony trailing wheels, the dual supporting springs, the spring housing caps, the upholder pedestals having the holder lugs, the intervening integral supporting frame having integral horizontal projecting flanges and the car or carriage supported by these elements.

531,577. Brake-Handle; Henry S. Teal, Chicago, Ill., Assignor to the Adams & Westlake Company, of Illinois. Filed July 21, 1894. There is a series of oscillating gripping jaws within the socket each having a curved face eccentric with the center of oscillation of the jaw. Means are provided for preventing disengagement of the handle from the brake staff during operation, yet admitting of the rotation of the handle upon or around the staff.


No. 531,445.

531,582. Railway-Car Brake; William Baxter, Jr., Baltimore, Md. Filed Dec. 12, 1894. A brake-shaft is mounted upon one end piece, a cross head on the brakeshaft, the brake-beam being supported from the end piece. Bell-crank levers are mounted upon the respective ends of the brake-beam, links connecting the ends of the bell-crank levers with the cross-head on the brake-shaft, and a controlling lever is also connected with this brake-shaft.

531,596. Brake-Handle; James W. Paterson, Chicago, Ill., Assignor to the Adams & Westlake Company, of Illinois. Filed July 25, 1894. The brake handle has a lower socket, a plate held within the socket, a brake staff, a hub, mounted on the staff, having a circumferencial groove, a series of friction rolls confined between the faces of the plate and hub, respectively, and a screw or pin projecting through the socket into the groove, whereby the socket may turn upon the hub and yet be prevented from detachment therefrom.


No. 531,499.

531,612. Brake Handle; Plato G. Emery, Chicago, Ill., Assignor to the Adams & Westlake Company, of Illinois. Filed on July 25, 1894. The brake handle has a lower socket provided with an inner grooved annular surface, a brake staff and a carrier having a series of slots or depressions eccentrically arranged with respect to the axis of the brake staff, and inclined from a line horizontal with said axis. A series of balls is confined within races formed by the slots or depressions and the grooved annular surface of the handle socket.

531,613. Sanding Device for Street Cars; William C. Fisher, Mount Vernon, N. Y. Filed Oct. 8, 1894. The box has a discharge pipe or spout, a slide valve, a valve rod connected by one end to the valve, a cam having a pinion wheel, and a rack for operating the cam and valve rod.

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Impending Strike in Brooklyn.

As we go to press, the trolley strike in Brooklyn is still impending and there is no immediate prospect of a settlement; in fact, the outlook for a peaceful outcome is by no means flattering. We sincerely trust that a compromise may be effected. There is much of reason in the demands of the men, and at the same time policy would seem to warn the companies most strongly against permitting a strike to take place. Public opinion in Brooklyn would not allow unexperienced motormen at this time to man the cars.

The Electrolytic Question.

Mayor Schieren, of Brooklyn, in his annual message announces that experts in Brooklyn are upon the point of discovering a way by which the troubles due to electrolysis induced by escaping electric railway currents may be avoided. We trust that this is so; if the prediction is verified, 1895 will be a notable year on the street railway calendar. No inkling, however, of any new and promising attack on the problem has leaked out up to this time, and, so far as we know the Brooklyn engineers almost wholly pin their faith in the improvement of their circuits to bettering the bonding and construction.

Grade Crossings in Connecticut.

Within the last year or so electric railway projects in Connecticut have multiplied with the most astonishing rapidity. They are paralleling existing steam roads in a way to amaze and dismay the owners of these latter properties. It is confidently predicted that before the close of 1895 the New York, New Haven & Hartford road will be paralleled from north of Hartford to west of Stamford, a distance of over 40 miles. It is not surprising under these conditions that a bitter conflict between these conflicting interests is confidently expected in the legislature this year. In the preliminary skirmish the trolley line has just gained a victory of paramount importance. Three judges out of five of the Connecticut Supreme Court have found for the Bridgeport Traction Company in the suit which involved its right to cross at grade the tracks of the New York, New Haven & Hartford road. The decision is a reversal of the finding of the lower court, and no little significance seems to attach to it inasmuch as almost all the new trolley roads are demanding similar privileges. The dictum of the court seems to sustain the position that the State railroad commissioners have assumed regarding their authority to control the crossing of roads at grade; that they have held that they were empowered not to prohibit them, but merely to regulate these and to surround them with proper safeguards. The grade crossing will now be opposed by the steam roads with even greater energy and acrimony, for obvious causes, and the owners will be loud in their complaints that the grant of such privileges is almost an act of bad faith, as it has been the policy of the State to do away with such crossings in the case of steam roads. Beyond a doubt the legislation to be passed this winter will be of the most sweeping importance to those contending interests in Connecticut.

Investigating Brooklyn Trolley Lines.

The report which we present this week of the investigation into the methods of operating electric railways in Brooklyn will be read, we think, with a great deal of interest. The State Board of Railroad Commissioners undertakes the task in response to public demand, though it does not appear to be its intention to pursue any definite policy. It merely intends to discover whether the reports of neglect and mismanagement that are so persistently proclaimed in the public prints of New York and Brooklyn have any foundation in fact, and if so, what means can be adopted to eradicate resulting evils. We sincerely trust that the suggestions of the State board will prove to have this ameliorating effect, though public confidence in such a desideratum is probably not especially marked. The Commissioners do not appear to be very well informed regarding street railway affairs, and, as a natural sequence, the recommendations contained in their annual report have not appealed very strongly to the street railway fraternity. In the investigation on Tuesday it was brought out that none of the Brooklyn street railway men had had his attention called to these suggestions. The queries of the chairman and the answers of the representatives of the several roads are interesting reading, although not a great deal was developed to indicate what course should be followed in order that accidents may be reduced. It is evident, however, that some regulations are necessary regarding rights of way in addition to those already in force. Absence of proper discipline and understood uniformity have, in a comparatively short time, led to accidents of a very serious nature. Brooklyn is so completely gridironed with rails and so much construction is under way or projected that more than the ordinary necessity exists for well-defined instructions to motormen regarding the crossing of tracks. It will be noticed that all the companies are not of one mind regarding the use of platform gates and the prohibition of platforms. The single company that leaves both sides of its rear platforms free of gates and allows passengers to stand on the front platform will find few street railway experts to approve its course. Platforms should without a doubt be guarded on the inside by satisfactory gates and the front platforms should be reserved exclusively for the use of motormen. To a very great extent the front platform should correspond in point of exclusiveness to the locomotive engineer's cab, certainly as long as the car is in motion. The front platform may, under certain circumstances, be used advantageously as an exit—in fact, such a plan would commend itself highly — were it not for the fact that a gate must then be left off and attempts to board the car at the front while it is in motion are encouraged and are likely to result in serious accidents. A shocking fatality of this kind occurred in Brooklyn a few months ago when a policeman, who might be expected to be an expert in this sort of thing, slipped in his attempt to board a motor car in motion by the front platform. The investigation has not yet been half begun. We trust that before it is finished suggestions of positive value not only to Brooklyn companies, but to those throughout the entire country, may be forthcoming from the testimony of the experts, if not from the conclusions of the board.

FENDER QUESTION IN PHILADELPHIA.

At a meeting of the City Councils' sub-committee on feeders in Philadelphia last week, George D. Widener, second vice-president of the Philadelphia Traction Company, stated that the company, after repeated trials of 15 or 20 different kinds of fenders, had selected one which the officials thought the best they have seen. They proposed to equip a number of trolley cars with it at once.

Henry C. Moore, president of the People's Passenger Railway Company, said the company was still experimenting, and had adopted a fender which the officers think is the best they have seen. It has been put on a number of cars, and others are being equipped with it daily. The evening before, Mr. Moore said, the fender had saved a boy's life.

Mr. Widener then spoke of the fender which had met with the Philadelphia Traction Company's approval. It had been tested several times, and had been attached to a Thirteenth and Fifteenth streets car for several weeks. It is the invention of Messrs. Kennedy & Roletter, of Philadelphia, and is made of steel strips, going entirely around the car. It is placed under the car in front of the truck, and is shaped like a very sharp cowcatcher or locomotive pilot. The point extends under the platform, and its tip is protected by a heavy piece of rubber. The edges close to the ground are protected in the same manner.

The fender is intended to push a person lying on the track to one side. At recent tests it is stated it was one of two or three which stood the test out of a number of different kinds.

Mr. Widener said that in at least a dozen cases persons had been pushed from the track by this fender, but the cry was now for a pick-up fender, which had been tried and found impracticable: They project so far in front of the car that people fall over them and wagons collide with them.

A model of the fender was exhibited by Mr. Widener. It has had but one actual test, and that was throwing an English mastiff from the track. Another model was exhibited of a fender which the Philadelphia Traction Company is constructing at its shops. It is a short cow-catcher attached to the dasher, running close to the ground. When the pilot strikes anything, wedge-shaped chocks are dropped on the track in front of the wheels, stopping the car almost instantly. This fender, Mr. Widener thought, would soon be ready for trial.

At the request of the committee Mr. Widener said he would have several cars equipped with the Kennedy & Roletta fender, and have a test for the benefit of the committee of both styles next week.

George S. Gandy, vice-president of the Electric Traction Company, stated that his company had adopted a pick-up fender for its Lombard and South street division, and the cars were being equipped.

Johns Hopkins, president of the Hestonville, Mantua and Fairmount road, told the committee that his company was testing three or four different fenders in the hopes of getting a practicable one. Some of those used in Baltimore, Mr. Hopkins said, did more harm than good.

The committee decided to meet within 10 days and view a practical test of the fenders of all the companies.

NEW YORK RAPID TRANSIT.

In his annual message Mayor Strong, of New York, makes the following reference to the rapid transit question :

> Of the many serious questions pressing for solution at the present moment that of rapid transit demands special consideration. On its proper solution depends not only the personal comfort of our citizens, but the easier conduct of business, the better development of property in the more northern parts of the city and the promotion of homes in outstanding localities to relieve the present congested condition nearer the city's center.

METROPOLITAN WEST SIDE ELEVATED RAILWAY, CHICAGO.

Secretary Higginson, of the West Side Elevated Railway Company, Chicago, recently made the following statement regarding the progress of construction :

"The west half of our Van Buren street bridge is finished. On the east side the foundation is in and there is nothing to do except to put the iron together. The bridge will be completed, I am sure, by Feb. 1. By the same time we shall have our structure built from the bridge along VanBuren and Franklin streets to Nos. 258 and 260 Franklin street, where our temporary terminal station is located. Workmen have been employed for several weeks in reconstructing the first three stories of the building at these numbers and fitting them up for a station. Our business will require 50 motor cars. They are built at Dayton, O. One of them has already been received, and several more are ready to ship. We require 155 passenger cars. They are built at Pullman and they are all finished. At our electric plant, just west of Paulina street, between Van Buren and Congress streets, one of the engines is now installed, and the other soon will be, though we can do business for a while with one. So that we may be running experimental trains on the West Side by Feb. 1 and trains for business Feb. 15. We shall use only our main branch at first. Our use of electricity as a motor will enable us to afford our patrons several other electric comforts besides smokeless and noiseless travel. We regard a down-town loop as an absolute certainty. As to these Wabash Avenue objectors, they might as well remember that Wabash Avenue is not the only street in the city. But there are too many large property owners interested in the loop scheme for it to fail or for it to be long delayed."

RECEIVERSHIP IN LINCOLN (NEB.).

The Lincoln Street Railway Company, of Lincoln (Neb.), which operates 40 miles of track in the city proper and suburbs, has passed into the hands of a receiver. Last week men representing a majority of the stock applied to Judge Dundy, in the Federal Court, at Omaha, for the appointment of F. W. Little, president of the company, as receiver, and on representations made to him showing the necessity for such action, the petition was granted. The crisis was brought about through the awarding of a judgment for $140,000 against the company in favor of Joseph Sampson, of Sioux City, a noteholder. In addition to this, the company recently defaulted in the payment of $12,000 interest. The concern is bonded for $1,300,000, and of this $600,000 draws interest. Inability to meet the interest on this sum resulted in the issuing of interest certificates, and default in payment on these in turn resulted.

The Lincoln Company is a consolidation of three independent companies, brought about through the efforts of Mr. Little nearly four years ago, when electricity was introduced as the motive power. The system for a year has little more than paid operating expenses. The bondholders are mainly New England companies. The receivership went into effect January 5th, and was the first intimation the public had of the true condition of the company.

ELECTRICITY FOR STEAM.

It is positively announced that the New York, New Haven & Hartford Railroad has taken preliminary steps to the equipment of two short lines of its system with electric motors next summer. The two lines are the Nantasket Beach and the Warren and Bristol, and it is not improbable that electricity will largely supersede steam on many branch lines at no very distant day. The most important move relates to the Warren and Bristol branch. Here it is proposed to start the line from the new station in Providence and carry it to Wautuppa station in Fall River, where a mile of new track will have to be built, a total distance of 21 miles. From Fall River the line will be extended to New Bedford, 14 miles; to the wharf and later to the other points, in all probability. From Warren the line will be run down to Bristol, distant four miles.

The current for these lines will be supplied by power-houses—one located at Warren, which will run the cars from Providence to Fall River, including the Bristol branch, and another at Westport factory on the New Bedford line. Both open and closed cars will be used on this line, which is 35 miles in length.

ACCIDENTS IN PHILADELPHIA.

The following statement regarding accidents has been made by one of the directors of the Philadelphia Traction Company :

"We are doing everything we can to avert the numerous accidents that have been occurring. On nearly every one of our lines the time for making trips has been lengthened and additional cars put on, so that there can be no necessity for running at a dangerous rate of speed. The men have been given longer lay-overs, and additional inspectors, wearing uniforms, have been put on the streets to watch the cars. Notices have been put up at all the car depots directing that the cars shall come to a full stop at street corners and that conductors shall not ring the bell to go ahead before their cars have come to a full stop Violation of this rule is made a cause for positive dismissal.'

BONDS FOR PHILADELPHIA MOTORMEN AND CONDUCIORS.

The Philadelphia Traction Company has concluded an arrangement with the American Surety Company, by which the latter company will give a bond for each new motorman or conductor appointed. Under the new plan an applicant considered desirable is referred to the Surety company, and if, on making the usual investigation into the man's habits and character it is satisfied to go on his bond for $500 he is appointed to a position by the Traction company. The fee charged by the Surety company, it is stated, is $6 for the first year, and $4 or $4.50 for subsequent years.

In the case of a motorman the bond indemnifies the man as well as the company against damages by accident, and in the case of a conductor it serves the same purpose and also indemnifies the company against embezzlement.

One of the officers of the Philadelphia Traction Company said, in reference to the new system, it would probably result in the company securing a better class of applicants for the positions of motormen and conductors. It would tend to shut out undesirable applicants and men who endeavor to secure positions on the street railways for the winter alone or as a makeshift, and who are often careless and reckless. The Surety company would not take the risk of going on the bond of any men that it did not consider careful and trustworthy.

WEST END TRANSFERS.

Vice-President Prentiss Cummings, of the West End Street Railway Company, Boston, says: "The transfer system of any road is demoralizing and allows of the perpetration of many frauds. Boys are to-day selling transfer tickets at the ferries and in many instances sell them to the conductors, who turn them in instead of a five-cent fare, but free transfers have to be given at certain points like Roxbury Crossing and the ferries.

"Last year the West End road issued 11,000,000 free transfers, and we contend that we give more free transfers in Boston than is common in any other city of its size. We carried 137,000,000 passengers last year, and thus $\frac{1}{13}$ or $\frac{1}{14}$ of the people were carried absolutely free, and we lost five cents in each case, but undoubtedly it caused more riding.

"Provided the whole system of transfers was rightly changed it would, of course, favorably affect the revenues of the road, but we are against the free system particularly for the opportunities afforded for fraud. The West End Company issued about 5,000,000 eight-cent transfer checks last year."—*Boston News Bureau.*

ELECTROLYSIS AND TROLLEY SPEED IN BROOKLYN.

In his annual message Mayor Schieren, of Brooklyn, has this to say regarding trolley speed and electrolytic troubles:

An electrical survey has been in progress since Oct. 1, having for its object the ascertaining of the amount of damage caused by the corrosion from the trolley current and the possible means of preventing further damage. From experiments that have been made enough has been accomplished to justify the hope that a remedy for the electrolytic action will soon be pointed out. The trolley companies are ready to begin and continue the remedial process, as the loss to them caused by the leakage of the current is quite a serious matter.

The question of speed of the trolley cars and a proper fender has received considerable attention, and is being carefully investigated. It is hoped to present to your honorable body recommendations prescribing proper rules and regulations governing the entire question. It is also hoped that a device will be secured to automatically shut off the electric current when the cars exceed a certain proper speed—for instance, 10 miles per hour. The trolley companies are desirous, apparently, of conforming to proper regulations, and have requested the police department to assist them in detecting unlawful fast running. There can be no question but what the enhanced speed is resulting to the city's good, in that it is a more rapid transit than the old horse cars, and as such is bringing the outlying districts nearer to the city. However, with it is the corresponding danger to life and limb, and it is absolutely necessary that some positive and decisive action is taken to regulate the speed of trolleys.

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NATIONAL ELECTRIC LIGHT ASSOCIATION.

Following is a partial list of papers to be read at the Cleveland meeting of the National Electric Light Association, Feb. 19 21:

"Some Economies in Electric Light and Power Stations." by Prof. Edward Weston.

"Arc Carbons and The National Electric Light Association Standard of Light," by L. B. Marks.

"The Monocyclic System," by Dr. Louis Bell.

"The Correct Method of Protecting Electric Circuits," by W. E Harrington.

"The Evolution of Arc Lighting Machines," by C. N. Black.

E. A. Leslie's paper, read at the Buffalo meeting, and entitled "The Operation of High Tension Currents Underground from a Physical and Financial Standpoint," will be taken up and discussed.

C. O. Baker, Jr., master of transportation, writes: "The Central Traffic Association have granted our application for excursion rates to the Cleveland meeting, and it gives me pleasure to announce that the rate from all points in their territory to Cleveland will be a fare and one-third for the round trip, on the certificate plan. The other associations will undoubtedly concede the same rate, due notice of which will be given."

JERSEY CITY, HOBOKEN & RUTHERFORD RAILWAY COMPANY.

Work on the lines of the Jersey City, Hoboken & Rutherford Railway is rapidly nearing completion, and it is expected that the line will be in operation by April 1 next. The company owns about 15 miles of double track which forms part of a trunk system, which will extend from the Barclay street and Christopher street ferries in Hoboken, through Jersey City, Rutherford, Paterson and Passaic. That part of the system known as the Paterson, Passaic & Rutherford Railway, consisting of about 20 miles of road, has been in operation about four months. The route of the Jersey City, Hoboken & Rutherford line is from the Hoboken Ferry, through First, Second and Harrison streets in Hoboken, and along the Paterson Plank Road to Jersey City Heights, through Congress street and Summit avenue, and again along the Paterson Plank Road to Rutherford, where it connects with the Paterson, Passaic & Rutherford Railway at Hackensack avenue.

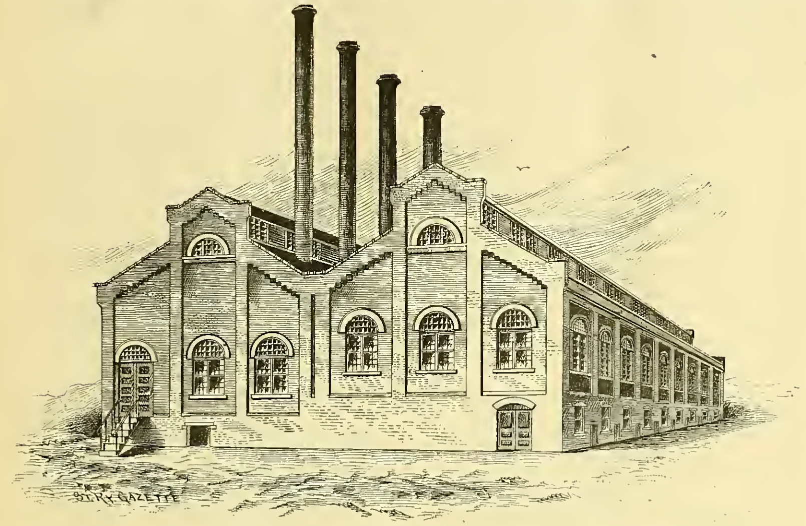

FIG. 3.—POWER HOUSE OF THE JERSEY CITY, HOBOKEN & RUTHERFORD RAILWAY AT HACKENSACK.

The greater portion of the road extends over level country, and with the exception of one short section the steepest grade is 3 per cent. This latter grade, which is shown in the accompanying illustration, Fig. 1, is one of unusual length. It commences at Second street, Hoboken, and extends along the side of the hill on the Paterson Plank Road for a distance of 4,000 feet, where the road reaches the level of Jersey City Heights. There are no curves exceeding 50 feet radius throughout the entire road.

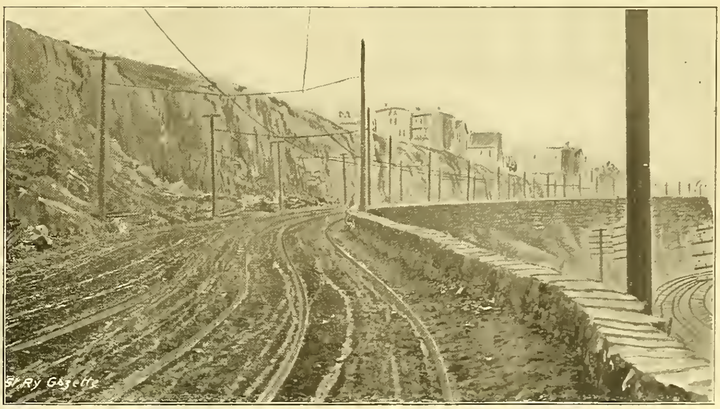

FIG. 1.—LONG GRADE ON THE LINE OF THE JERSEY CITY, HOBOKEN & RUTHERFORD RAILWAY.

The track construction in the city consists of 9 inch, 90-pound girder rail, spiked to 6 × 8 inch oak ties 7 feet in length on braced tie plates. The greater part of the track in the suburban district is laid with 70-pound T-rail. The joints are double bonded with 00 copper wire riveted to the rail. The rails were furnished by Wm. Wharton, Jr., & Co., and the Pennsylvania Steel Company.

The overhead material consists of selections from the best makes. In Hoboken iron side poles are employed, and in the suburban districts octagonal wooden poles have been set. As there has been considerable opposition to poles on the part of property owners in certain localities, the engineer of the road has determined to place poles in portions of Hoboken where the blocks are not over 200 feet long, only at the intersection of streets. Guy wires extending from the poles for a distance of 50 feet in each direction will support the trolley wire. The arrangement which is followed is illusorated in Fig. 2.

The cars to be operated on the road will be supplied by the St. Louis Car Company, of St. Louis. Mo. They are 34 feet in length, mounted on double trucks built by the same company, and each are equipped with two 30-H. P. Westinghouse motors.

The company has purchased a tract of land containing about 30 acres and situated on the Hackensack River about five miles from the Hoboken ferry and forming part of a very desirable town site. The streets have been located, sewerage has been designed, and when electric cars are introduced, it is expected that the town will be rapidly built up. The road crosses the Hackensack River near the power station over a double-track trestle bridge 1,000 feet long built by the company. Work on the power station, Fig. 3, is being rapidly pushed forward. The foundations and walls are completed and the roof trusses are now going up. The building will be a substantial fire-proof structure and will be constructed of brick with stone trimmings, its dimensions being 100 by 164 feet. The roof will be slate, supported by steel trusses furnished by the Pennsylvania Steel Company.

The power equipment will consist of two cross compound condensing Corliss engines of 500 H. P. each built by the Bass Foundry & Machine Company, of Fort Wayne, Ind. They will be directly connected to Westinghouse multipolar generators of 370 kilowatts capacity. The station will be equipped with a 15-ton traveling crane built by the Pennsylvania Steel Company, and railroad tracks will extend into the structure, so that machinery can be taken directly from the cars by the traveling crane.

All wiring and steam pipes will be located under the floor, an arrangement that adds greatly to the appearance of the station, as well as materially facilitating the handling of machinery in case repairs are necessary. The positive feed wires will be carried to the switchboard through vitrified pipe, and the negative wires through six-inch cast-iron pipe. The steam piping system will be of the latest design and will embody several new and interesting features. Worthington independent condensers and Goubert feedwater heaters will be employed. Condensing water will be taken from the Hackensack River. The boiler equipment will consist of three 275 H. P. Climax boilers built by the Clonbrock Steam Boiler Works, of Brooklyn. Eack boiler will have its separate steel stack. An admirable arrangement for disposing of the ashes has been arranged. With this end is view, the boiler foundations were built so as to form a tunnel, the boilers being mounted on steel beams let into the walls. The head room of the tunnel is sufficiently large so that ash cars can run through on tracks. The boilers are provided with hoppers from which ashes may be dumped directly into the cars. The ashes will be used for filling in the meadowland between the station and the river.

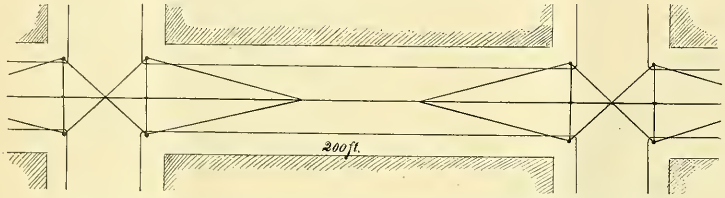

FIG. 2—METHOD OF SUSPENDING TROLLEY WIRE—JERSEY CITY, HOBOKEN & RUTHERFORD RAILWAY.

The facilities for receiving fuel are of the best. Coal will be brought to the boiler-room both by railway and canal on the property. A complete system of coal-handling machinery will be employed. Steel coal bunkers with 3,000 tons storage capacity, will be located directly over the boilers, and coal will be delivered by shutes to each of the four firedoors of the boilers. Feedwater will be supplied by an artesian well on the property, 500 feet in depth, and with a capacity of 50 gallons per minute. An arrangement will be provided so that in case of necessity the feedwater supply may be taken from the city main.

The carhouse, carpenter shop, paint shop and repair shop will be located on the same plot of ground as that on which the power station has been erected. The carhouse will be 80 by 264 feet, and will be constructed of brick, with galvanized iron roof, supported by steel trusses furnished by the Pennsylvania Steel Company. The building will be provided with seven tracks, three of which will be supplied with pits extending the entire length of the building, although the word pits is perhaps not the best descriptive term to use in this connection, as the entire space beneath the tracks will be left open. The tracks will be supported by brick cross walls, into which are sprung concrete arches covered with Portland cement, Fig. 4. Flat rails spiked to wooden stringers laid in the cement floor will be employed throughout the building. Tracks will be laid so that a grade of 1¼ per cent. will be formed, the grade extending in a straight line outside the carhouse to a distance sufficient to accommodate as many cars as may be located on the tracks in the building. By this arrangement, in the case of fire, cars can be quickly run out of the structure by gravity. Steam for the heating of the building will be supplied by the power station. The structure will be supplied with numerous traveling hoists for facilitating the handling of car bodies. Admirable arrangements have been made for the comfort and convenience of the employees. There will be comfortable waiting-rooms and toilet-rooms heated with steam.

The machine shop adjoins the carhouse, and is about two-thirds as long as the latter. This department will be equipped with the most approved types of machine tools, together with traveling cranes and forges. A special room will be provided for winding armatures. The carpenter and paint shops will be located between the power station and machine shop, and will occupy a substantial brick building whose dimensions will be 150 × 132 feet. All the work on the road and the buildings is done in the most thorough and substantial manner. The entire work was designed by Chief Engineer Thos. H. McCann, and has been executed under his supervision. Mr. McCann has been ably assisted by David Valentine, mechanical engineer; A. H. Hayward, manager; Albert Beyer, architect; and Alfred Debevoise, superintendent

The officials of the company are Charles A. Johnson, president; J. A. Morrisse, vice-president; Louis Fitzgerald, treasurer; John McGuinness, Jr., secretary; Sidney Rowlands, resident engineer.

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STREET RAILWAY BANQUET.

It is the custom of the Houston (Tex.) City Street Car Company to give its employees a banquet each year during the holiday season. This year 125 motormen and conductors, as well as the officers of the company and heads of departments, sat down at the tables. The men made a presentation to the superintendent—Fred Mundes—and after he had thanked the secretary of the company, C. A. McKioney, made a little speech, in the course of which he said :

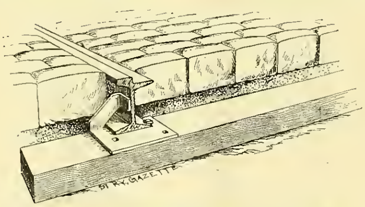

Fig. 5.—Track Construction—Jersey City, Hoboken & Rutherford Railway.

"The management of this company ask only good, honest work of its employes. The management are employes just as you are. They are employed by the stockholders to manage their business. If, therefore, we should seem too particular about little things, you should remember that it is the little things that make up the company's business. It is the slight mistake that causes an accident and a lawsuit. It is the little things that make the serious matters, the nickels that make the company able to pay its employes. I am glad to say that the most cordial co-operation exists between the company and its employes."

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COMPULSORY ARBITRATION.

BY R. D. FISHER.

The doctrine of compulsory arbitration is urged upon the law as a remedy for inability or unwillingness to agree between employer and employee. It is safe to say that the doctrine must be considerably developed and improved before there can be the slightest prospect of its possible advantageous adoption by a street railway company and its employees as servants. The tenure of an employee rests on a contract, and with street railway companies a custom fixes a short term—as in the case of a yearly, monthly, weekly or daily employment, according to the formal agreement for services of the higher grades to that of the lower. But in all cases whatever, at or before the expiration of these wage periods or terms of contract, each party or employee is free to decline to continue or renew the relation for another period or term.

The proposal of compulsory arbitration is to make the relation absolutely indissoluble except by mutual consent or by a dissolution granted by arbitrators. A company may be unwilling to employ the men who refuse the offered wages, and compulsory arbitration would decide whether the company could afford to pay more and still successfully operate its lines.

If the question of compulsory arbitration were put on a small scale and within the compass of ordinary everyday experience it would certainly appear ludicrous. But it is proposed to apply it to employers of men. If a company employs men, and patronage fails it must either reduce wages or reduce the number of employees. But men cannot thus be dismissed. An arbitrator must be called in and the question whether the company is able to support the original number at the old rate of wages must be determined. Compulsory arbitration in its very nature is impracticable of application to the future unless each party to the controversy is left free to go or not upon the terms fixed by the arbitrators. It will not be found practicable to compel even a corporation that has fulfilled all existing contracts with employees to go on with giving employment in future on terms fixed by an arbitrator and involving in its own judgment a loss.

The invention of compulsory arbitration marks the latter part of a century which has produced great changes in the law of master and servant, including the numerous changes wrought by the organization of labor; the abolition of the doctrine of constructive service; the introduction of the doctrine that the servant, by engaging accepts the usual risks, including the negligence of fellow-servants; the adoption of the Employer's Liability Acts in several States; the establishment of the lawfulness of combinations of laborers to enhance

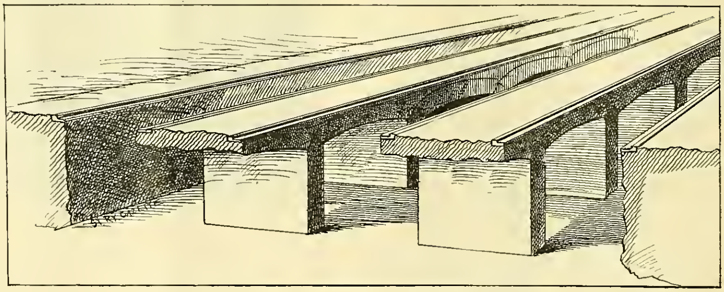

FIG. 4.—PIT CONSTRUCTION IN POWER HOUSE—JERSEY CITY, HOBOKEN & RUTHERFORD RAILWAY.

wages, and the unlawfulness of combinations of employers to raise the selling price of products; recognition of the unlawfulness of boycotts. The general drift of these changes is manifested by the substitution of the words employer and employee, for master and servant, and the difficulty in distinguishing between "wages" and "salary." This change has gone so far in the conception entertained by some minds in the legal profession, as well as labor agitators, as to advocate that no difference exists between the legal relation of master and servant and of principal and agent.

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INVESTIGATING THE BROOKLYN TROLLEY SYSTEM.

The New York State Board of Railroad Commissioners met in Brooklyn last Monday to investigate the operation of the local trolley system. The investigation was made in response to complaints that the street railway methods were such that an extraordinary number of persons had been killed and injured. Among the representatives of Brooklyn street railway companies present were: President D. F. Lewis, S. D. Norris and W. A. H. Bogardus, of the Brooklyn Heights Railroad Company; John N. Partridge, Brooklyn City & Newtown Railroad Company: A. W. Slocum, Coney Island & Brooklyn Railroad Company; B. Norton, Atlantic Avenue Railroad Company. After the session had been called to order Chairman Beardsley announced that complaints would be received. Col. Wm. F. Hemstreet made a formal complaint against the Atlantic Avenue line.

His statement set forth that over this line cars were run over parts of the route as fast as 18 miles an hour and between streets as fast as 13 or 14 miles an hour. This was particularly true at night, when great speed was not necessary and the darkness increased the danger to pedestrians. The sleep of the residents along the line was disturbed on account of the unnecessary noise, and the value of property was consequently diminished. Over a space of 250 feet along the line of the road, Mr. Hemstreet said, he had timed 37 cars after midnight. The average running time in every case was at the rate of 13½ miles an hour, and a few went as fast as 17 or 18 miles an hour, and this although the legal running time is 10 miles an hour. Mr. Hemstreet said that, although 100 persons had probably been killed and 200 or 300 injured, the speed was practically unrestricted, and to any complaints the officials of the roads replied: "If the people would exercise as much care as the employees of the road, there would be fewer accidents."

He further complained that motormen and conductors of the line often paid no attention to the signals of passengers. Further, cars stopped only at corners of streets. Mr. Hemstreet thought the companies should be mandamused to stop their cars whenever hailed. He also complained that cars were not properly warmed or cleaned. Then, too, complaint was made of the fenders on the cars. It was asserted that those now in use were worthless. In conclusion the petitioner offered the following suggestions:

1. Speed limited to a judicious minimum, and detectives and informers set to watch any violations of the limit fixed. All violations should be heavily fined and the fines given to the informers.
2. Speed at night should be limited to horse car time.
3. Cars should stop whenever hailed.
4. White pole stations should always be kept clear of snow.
5. Crossings should be kept clean.
6. The city should have a local railroad commission.

Chairman Beardsley called attention to rules and regulations for the operation of surface cars which the commission had drawn up and began with the first one which he thought had been violated and asked: "Do your cars come to a full stop when they reach a crossing of another railroad, or what provision for safety is there?"

President Norton, of the Atlantic avenue railroad: Our cars come to a full stop and give other cars the right of way. That is the rule of the company and there are penalties for its violation.

President Lewis, of the Brooklyn Heights company: We have our motormen hold up the cars and then not cross until the conductor gives the two bells to go ahead.

Mr. Beardsley: How about people on the front platforms?

Mr. Norton: That is a rule I have never known to be violated on our cars. We permit no one there but the motorman.

Mr. Lewis: We do permit people to ride on our front platform. Just let me say here that these rules of the commission are new to me. I have never before heard of them. This question of having people on the platforms is one to which there are two or three sides. It prevents people from smoking, and that is quite a hardship to a great many of our passengers. If the front platforms are closed it is hard to get people in and out, all by the rear door. It overloads the rear of the car, and if there is only one motor used it prevents the traction of the first wheels, which is a matter of considerable importance. On the Broadway cars they keep the front gate open, but permit no one to ride.

Mr. Beardsley: Why couldn't you do that?

Mr. Lewis: We could. There is really only one objection to people riding on the front platform, and that is the danger of their talking to the motorman.

Mr. Beardsley: They talk, distract his attention, and interfere with the operation of the cars?

Mr. Lewis: That may be so. I don't know it.

From platforms the investigation drifted to fenders. It was found the cars of all the roads were provided with fenders—the best that could be obtained, it is said; but that these were not altogether satisfactory. W. A. H. Bogardus, formerly the general manager and now the secretary of the Brooklyn Heights Company, had made the subject of fenders a study, and he furnished the commissioners with some information. He said that the first fenders tried were fastened to the cars 5 inches from the pavement. On account of the unevenness of the latter the fenders were soon broken. Then the fender which is now generally in use was adopted and fastened 8 inches above the pavement. The fenders are intended to pick up the persons struck by them if those persons are standing at the time. No fender has yet been devised, he said, which will pick up a person after he has been knocked down.

Chairman Beardsley then wanted to know if the companies were observing the regulations of the commissioners with regard to keeping the inside rear gate on every car closed.

President Norton: Were those rules and recommendations forwarded to the companies? I have never seen them before.

Mr. Beardsley: They are in the annual report of the commission.

Mr. Norton—We cover most of them, now that I look them over, by our own rules. So far as this question of speed is concerned, that Colonel Hemstreet has spoken about, let me say that I am glad to have any violations of our rules made known to me. We hold the motormen as closely to them as we can. The white pole station to which he objects is directly in accordance with your recommendations, and I had heard no complaint about it until to-day.

Mr. Lewis said that the inside rear gate was not in all cases kept closed, and he maintained that more accidents were caused by keeping them closed than by allowing passengers to alight on either side of a car. He said that if people were allowed to get off on the side next to the tracks along which other cars were running they would look in either direction to avoid a collision. If, however, they were obliged to go around the rear of a car to cross a street, they might run in front of another car in motion without seeing it.

The chairman reminded Mr. Lewis that there was also a regulation which provided that all cars should come to a standstill at trolley crossings. This Mr. Lewis said was an utter impossibility in the business sections of the city. A constant blockade would be the result.

Colonel Partridge, of the DeKalb avenue line: I have never seen those recommendations. Those you have spoken about we have of our own. At crossings with other railroads we come to a three or four-mile an hour speed.

Henry W. Slocum, of the Coney Island & Brooklyn Company: We comply with most of those rules, although I have not seen them before. At crossings our rule for motormen is to have their car under perfect control.

Mr. Beardsley: This rule about guards on cars—what has been done about that?

Mr. Lewis: We have not put guards on open cars because we think it is more dangerous.

Mr. Beardsley: It would not be so if the cars coming in the opposite direction stopped instead of passing a car, taking on or discharging passengers.

Mr. Lewis: We could not put any such rule into operation on Fulton street. It would inconvenience us and the public. Having guards is also an inconvenience. I did not know there was such a regulation in your recommendation.

Mr. Beardsley: In regard to your motormen. How do you examine them?

W. A. H. Bogardus, secretary of the Brooklyn Heights Railroad, explained the system employed. The company opened a school about one year ago. First applicants are examined physically and as to their character. Then they have the working of the cars explained to them and for two weeks are given ample opportunity to learn how to operate the cars, under the personal direction of competent instructors. The cars are operated upon an independent track, so there is no danger of collision.

Mr. Silliman, of the Atlantic Avenue Company, said their motormen were given two weeks with an experienced motorman, who were personally instructed by himself. They were also examined as to their health, and had to be able to read and write.

Mr. Beardsley: Mr. Partridge, tell us what you do about the speed of your cars.

Colonel Partridge: The men are given time cards, exactly the same as when we operated by horses. The maximum speed which we permit our cars to be operated is eight to nine miles an hour; the average is about seven miles an hour. On Fulton street it is just the same as it used to be when we had horses.

Mr. Beardsley: How about these 17 and 18 mile-an-hour cars?

President Norton: Those cars were on my line. I am glad, as I just said, to hear them reported. Our time cards call for no speed more than 8½ miles an hour, and the average is under 8 miles an hour. We do not permit any time to be made up if the men happen to get behind. On the question of noise, to which Colonel Hemstreet objects, all I have to say is that we have the best cars and the best roadbed we can secure, and further than that I can do nothing.

Mr. Beardsley: Do you run faster at night?

Mr. Norton: Our first rule prohibits operating the cars any faster at night than at any other time. I'll say now that I will be glad to hear any complaints which people have to make against the company, for it is our desire to give the most satisfactory service we can.

Mr. Beardsley: You think it is the fault of the motormen and not of the rules?

Mr. Norton: I think that if the rules were to be obeyed, there would be fewer accidents. I also think that if the people would be more careful it would result very beneficially. I know that at least 75 per cent. of the accidents have happened to children under 10 years of age. In most every instance the children have been playing in the street.

Mr. Beardsley: What is your idea of getting the rules enforced?

Mr. Norton: Rigid discipline is the only thing I know.

Mr. Beardsley: If these rules were followed out there would be fewer accidents, you think?

Mr. Norton: That is exactly what we tell to our motormen. It is, however, impossible to get men who will follow rules implicitly. We certainly do not invite accidents. I think that a safety fender, if we can find one that will prove satisfactory, will be a material aid in preventing accidents.

Mr. Beardsley: Where were most of the children hurt, between or at crossings?

Mr. Norton: Between the crossings. Our rule is where there is a serious accident to take off the motorman anyway. Even if it is not his fault we make no discrimination. It is hard on the motorman and frequently loses for us a good man, but it is a rule which in the main, I think, works well.

Mr. Lewis: I can give you some figures on the number of accidents which have occurred. In 1893 there were 33 fatal accidents. In 1894 there were 10, that is, so far as our company is concerned. In 1891 there were 7 by horse cars. That is to say, we have killed 3 more this year by the trolley than in 1891 by horses, and we have carried about 20 per cent. more people. In 1894 we carried about 100,000,000 passengers, through streets which are narrow and poorly lighted. I think that is a good, rather than a bad, record. We have full rules relating to the speed of the cars, and it is not, according to the time points, necessary to operate cars at any place faster than 10 miles an hour. We do not permit the men to make up lost time, and have an agreement with them by which we pay them at the rate of 30 cents for overtime when there is a good reason for their having been late.

Mr. Norton spoke of the rule of stopping the cars before passing another which was taking on or discharging passengers. He said it was to his mind the best thing which had been suggested, only he did not think it could be worked on a crowded street. "On the crowded streets," he said, "it is not necessary to take such precaution, because the accidents which occur there are few in number, I suppose because the speed is low."

Mr. Lewis immediately took exception to this. He did not think it was the speed, but because people on crowded streets took more care, that there were fewer accidents. "If the people will take as much care as the motormen do," he said, "it will do away with 75 per cent. of the accidents."

Mr. Norton said that he thought there should be some way of punishing the mortormen when they violated the rules of the company—some city ordinance.

Mr. Lewis explained further what was meant by Mr. Norton. "I think," said he, "that violators of the city law which prohibits more than ten miles an hour speed for trolley cars should be punished. If it is the motorman's fault he should be punished, and if it is the company's fault the punishment should be upon the company. I do not think that the accidents are so much the fault of the motormen as they are of the people who are careless. If there are violations of the law I think they should have a penalty attached. I do not say this to invite more hardship for the men, but among 5,000 men there must be some who by their constant violations of the law will demoralize all of them.

Ex-Judge **Morris** counsel for the Brooklyn City Railroad, spoke briefly against having gates on the front platform and on the back platform as well. He said they were responsible for a large number of the accidents.

The commission then adjourned until next Tuesday.

It has already been announced that Mayor Schieren, of Brooklyn, has appointed a committee of five to investigate the local trolley system. This committee decided to follow a plan independently of the State Commissioners.

ELECTRIC RAILWAY FREIGHT SERVICE.

J. S. Polk, president of the Des Moines City Railway Company, recently made application to the City Council of Des Moines for the privilege of running night freight trains. In the course of his address before the council he said:

In so far as this ordinance authorizes the transportation of freight, I would say that this feature was urged upon the railway company by the several brick plants and coal industries lying north of Des Moines, in the Des Moines valley, which are wholly deprived of railway facilities. There are two brick plants located in North Des Moines. They were located there because of the clay and coal banks found in that vicinity in rich and inexhaustible beds. These industries have now a capacity of 180,000 brick per day—20 carloads. They cannot compete with other brick plants in Iowa and Illinois because of the large expense they are put to in the hauling of their product from their mines and factories to the railways. It costs them $10 per carload to haul their product from the mine and factory and load it upon the cars in the city. If they were permitted to haul this product over the street railway on some line that will be selected therefor, they can get their product delivered to the railways for $3 per carload, or, in other words, there will be a saving on each carload of freight shipped of $7 per carload, which of itself would furnish a good margin of profit on their business. It would enable them to compete with the other brick plants in the city and elsewhere, and furnish cheaper brick and cheaper coal than we are now using and consuming. One-half of the coal burned in the city of Des Moines is brought from Mahaska, Marion and other outside counties. The coal we buy from these counties is paid for by the citizens of Des Moines, and the money is expended in building up Mahaska and the other counties, and is of no benefit to Des Moines. We have rich and inexhaustible beds of coal underlying the north part of our city. It is important that this coal should be mined. It cannot be mined without railroad facilities. No railroad can get into this district without going up the Des Moines River, because these points are cut off by the bluffs on either side of the river.

In fifty-five cities of the United States the street railways are carrying the products of the mines and industries to the railroad centers in the cities. This is not a new feature in electric street railroading. It is one that has been in operation for years with great advantage to both the manufacturer, the miner and the laboring man, and the cities in which such business is conducted.

Mr. Polk referred to the freight service of the Monsam River Electric Railway, Sandusky, Milan & Norwalk Electric Railway, Horneilsville Electric Railway, Frankford Electric Railway, Tama & Toledo Electric Railway and continued:

Electric street railways are also being used in various cities for other purposes and I hope will be so used here. They are sweeping streets by electric brooms, depositing the garbage in the freight cars of the company and sending it to the suburbs. A considerable amount of the expense of sweeping the streets might be thus saved by the sale of this fertilizer to the truck farmers so brought in close contact with the city by the electric roads. They are also discussing the question in Boston of putting upon the street railway fire cars, or cars constructed for the purpose of carrying the fire apparatus, hose carts, horses and firemen out to the distant suburbs of the city. If such a use of the road should be adopted in the city of Des Moines, it would enable the city to load its hose cart, horses and firemen upon an electric car, which should be constructed so as to throw down an apron at each end for receiving and discharging such hose carts and horses. These cars, on an alarm of fire being sent in from the Fair Grounds, Highland Park, University Place or Sevastopol, could be sent to the scene of the conflagration at a very rapid pace, and neither the horses nor the firemen would be worn out in making the trip. It would be made very quickly and would result in immense advantage to the suburban districts of our city.

These uses of electric cars in the cities are not new uses of street railroads. They are very rapidly being adopted in the United States as well as England and France. There is no reason why we should not have the benefits resulting from this great power. These roads will eventually be extended into the country. The farms, the hamlets and the villages of the country will eventually be connected with the city by such roads. Their farm products, their farm supplies and the freights to and from the country homes will necessarily be brought in upon these roads, and unless they can be brought in to the central portion of the city to some general or common market the benefits of such service will not half be realized by the parties along the lines. This service will tend very largely to build up the city both in population and in increasing and developing its manufactories. It will enable our laboring people who are now confined to close tenement-houses in the city to go out on cheap lands, and build them nice comfortable homes, and if employed in the city they can reach the place of their employment quickly and cheaply, or in other words will give them all the pleasures and benefits of country life while being really citizens of Des Moines.

In regard to the franchise asked for the company desires the right to use all of its lines for the carrying of freight and express. In regard to heavy freights we do not ask, nor could we if the right was granted, run freight cars over the various street railway lines. The construction is not such as to admit of the passage of heavy freight cars over the same without the absolute destruction of the tracks. What is desired by the several industries of North Des Moines is that they be permitted to haul the output of their manufactories and mines to some central point in the city which shall be in connection with the various railroads running into and out of the city. This can be done and should be done by limiting it to some one or more lines. The industries of North Des Moines should be accommodated in the transportation of freight over what is known as the Belt Line, and this line should be connected with the Sevastopol line, and the industries in the southern part of the city would thus be accommodated by that line. There could also be some line adopted upon the east side of the river, from which the freights from the surrounding manufactories on the east side of the river could also be brought into the city.

We do not ask that this right should be granted to the railroad company without compensation. We ask that the privilege be granted for a reasonable compensation to be fixed, and that the same be surrounded by all necessary rules and regulations for the protection of the city against the abuse of the right. We are satisfied that, if such grant is made, in time the city will derive much revenue from the income of the road, and the industries surrounding Des Moines will be greatly enlarged and increased and the population of the city will be doubled in a short while. It is important that this question be settled at an early day, that the industries affected thereby may make arrangements for a large output during the season.

IMPORTANT LEGAL CASE.

Judge Cullen, of Brooklyn, rendered an important decision this week in the case of Morrison against the Brooklyn Heights Railroad. It arose from the death of Annie Morrison, a child, who was run over and killed on Nov. 3, 1893, while crossing Myrtle avenue, at Sanford street. Her father, James Morrison, began suit against the company for $5,000 for loss of her services. A year after commencing the suit he died. Letters of administration were then taken out by Mrs. Morrison and she continued the suit. When it came to trial, Lawyer Whitehouse, for the company, claimed that under the statute the father only was entitled to the services of the child, and that hence only he could recover damages for the loss of those services.

Judge Cullen sustained Mr. Whitehouse and directed the jury to render a verdict only for the actual burial expenses of the child, as it was not proved that the services which the child, had she lived, could have rendered her father up to the time of his death were of any value. An appeal will be taken.

ELECTRIC TRACTION DISCUSSION.

The following discussion of the papers on Electric Traction by H. D. Wilkinson and C. S. Du Riche Preller took place at a recent meeting of the London Institution of Electrical Engineers:

S. Z. **de Ferranti** said it might be interesting to consider for a moment what were some of the probable causes which had led to the backwardness of electric traction in Great Britain. In the first place he thought they had a very exaggerated idea of the hideousness of an overhead system. This was a very unfortunate thing, because the overhead system appeared to have been proved to be quite the cheapest way of working for the largest number of applications in the way of running tramways in and about towns. This had been proved undoubtedly to be the best system for the purpose commercially, and therefore it was one which ought to receive the very greatest consideration, and one which was likely to come first, it other objections were put on one side. With regard to this objection of unsightliness, no doubt still further improvements would be made which would render the lines better looking, and he had no doubt that, being accustomed to seeing them, they would forget that they were ugly, and think rather of the great convenience they would give. The second great trouble appeared to him to be that of fire escapes. Perhaps in America the houses were too high to make it worth while trying to save people by fire escapes; but, however that might be, in Great Britain most people he had spoken to had met him with this difficulty, that the wires were in the way of fire escapes, and therefore an overhead system could not be tolerated. To meet this difficulty, he would suggest that electricians should reinvent, redesign, and give for nothing to the various authorities fire escapes which could be worked without interfering with the overhead lines. The next question was that of danger, and that, he thought, was far more fancied than real. No doubt accidents might occur through overhead wires dropping, but they were infrequent, and that was not a difficulty which should be set against the immense advantages which would come from rapid traction. There was another thing which had militated very much against the development of electrical tramways, namely, the obstructions which had been put in their way. Perhaps he was not right in calling them obstructions, but they had a custom of always protecting the man in possession. That was to say, if there was an existing industry, say, for example, the telephone industry, the whole legislation tended to protect that particular industry, and to see that the coming one, however beneficial and important, did nothing to interfere with the existing one. Account did not seem to him to be taken of the fact that both industries should contend together to protect themselves. He thought this was very notable some little time ago, when every provision was made for the existing industry, and every difficulty put in the way of the new one. He was afraid this was one of the troubles they would suffer from a great deal. Then there was another thing, and he feared a far greater trouble. They knew that everything of a new nature required an immense amount of personal effort and continual work to bring it forward. Electric traction required all the energy of the whole electrical industry, whether they were strictly interested in this particular branch or not. Too much could not be done in this way in order to make matters progress, but he fancied that the primary power in moving people toward pushing electric traction forward was absent, in the fact that there were no particular systems so far as he knew in Great Britain, which were the particular property of different individuals with capital at their command, or different manufacturing corporations.

A. **Sharp**, in referring to the effect of the varying traffic, and especially in starting cars, said the most effectual remedy was the use of an accumulator battery which absorbed any excess of supply in the generator over demand in the line, and made up for any deficiency of supply, so that the steam engine and generator could always run at full and constant load. He would like to call attention to the merits of an ordinary flywheel as a means of storage of energy for the particular purpose of electric traction. Energy stored up in a moving body was proportional to the weight and square of its velocity, so that if they could increase the velocity of the rim of the flywheel, they would get a considerably greater increase in the energy stored. He hoped to point out before he had done that they had not reached the safe limit of speed for flywheel rims. Suppose they made a flywheel with a rim velocity of 300 feet per second. One pound weight of rim would consume 95 H. P.-minutes, and with an effective velocity of only 5 per cent. above and below the average, the available energy would be 19 H. P.-minutes; that was, a flywheel of 10 tons weight running at that speed, and with a 5 per cent. variation of velocity, would give 190 H. P.-minutes available to meet the excess and deficiency of energy. At present, with the ordinary construction of flywheel, the safe speed seemed to be about 100 feet per second. Americans ran things much closer in running flywheels at high speeds, and they, unfortunately, seemed to get a good many cases of flywheel accidents. Now, the breaking of flywheels was usually attributed to the severe centrifugal stresses on the rim. What were the facts of the case? If they treated the rim of a flywheel for a moment as a circular ring rotating about its center, then, of course, there were centrifugal forces acting radially outward at every point. Those forces produced circumferential stress on the rim, so that considering the equilibrium of the upper portion of the wheel, they had the resultant radial centrifugal forces balanced by the tension stresses on those two sections of the rim. At the speed he had mentioned of 100 feet per second, the centrifugal stresses were less than half a ton per square inch, but in large flywheels with a small number of arms they had quite a different state of things. They had in a flywheel with, say, eight arms an intense radial force directed inward, so that the segment of the rim between the arms was in the condition of a beam loaded uniformly and supported at the ends. Now, the bending moment of any beam loaded with load w per foot-ton is proportional to wl^2, l being its span. The bending moment then could be reduced by reducing the span of the beam, so that if they doubled the number of arms the bending moment was reduced one-fourth, and if the number of arms was quadrupled the maximum bending moment on the rim was reduced to one-sixteenth. Now, the solid disc flywheel to which Captain Sankey had referred was in this respect very much better than a flywheel made with six or eight arms. If he might be allowed, he would describe a flywheel which he had invented. In this he replaced the ordinary cast-iron arms by a number of spokes of mild steel, and he arranged them tangentially in somewhat the same method as the tangential spokes of a bicycle wheel were arranged. But the method of construction was essentially different from that used in bicycle construction. He formed a pair of spokes from one piece of steel, the middle portion passing round the nave and the ends being fastened to the rim by nuts in the ordinary way. There was absolutely no fastening of the spokes to the nave, except that due to friction, so that the construction was decidedly cheaper.

J. D. **Dallas** said it was perhaps not generally known that one of the principal reasons for the great advance of electric traction in America was on account of the gearing they had adopted. In Richmond, Va., on the first electrical tramroad, Sprague placed single reduction gears on his motor, and, because that was not successful, he arrived at the conclusion that traction was not a success; but when the gearing was altered to double reduction, that was to say, with two pinions and two gears, the road became a great success. The fault did not lie really with the gear, but with the motor, which was not strong enough to do the work. Double reduction motors then became the vogue until 1891, when he thought nearly every road in America began to operate with double reduction motors. He saw on the wall a drawing of the original motor belonging to Bentley-Knight. Those motors had two pinions and two gears, the intermediate gear was a solid gear forced on the axle by hydraulic force, and the gear on the axle was a split gear of cast iron. In each case the teeth were very carefully cut out in milling machines. There were great losses in these gears, amounting to as much as 15 per cent. The loss in the gear varied from the maximum: that was to say, there was some load on every motor when the whole useful work was taken up in the gear. By the introduction of single gear motors these losses, which had amounted to 15 per cent., were immediately reduced to 6 per cent. for all working loads; that was to say, from about when the motor was delivering about 5 H. P. up to a point where it was delivering its maximum of about 15, the loss in the gear, which was about 6 per cent., did not vary at all; that was to say, a good gear running in a gear cover, and fairly well lubricated. Many different forms of pinions had been used. Bronze pinions were about as good as could possibly be used for reducing the loss, and also for the reduction in noise; hide gears at one time were thought to be excellent things, and were used for a short period only, because they rapidly fell to pieces. The next improvement was to laminate the rawhide pinion by successive layers of rawhide and sheet steel or iron. But these as soon as the edge was slightly worn down cut the gear like so many saws, and they were rejected. At present, preference lay between forged steel, milled out, and bronze. For himself he had made many experiments. He was in the Thomson-Houston testing department for a long time, and he thought they had come to the conclusion that there were smaller losses from a cast-iron gear than in any other form, the cast-iron being close grained, and with a considerable quantity of wrought-iron scrap mixed with it. This gave a very strong gear, which worked very well. He could give an illustration of the strength of these gears. He once saw a nut dropped by mistake into the gear, which was running at 900 armature speed. The nut was dropped in between the cast-iron teeth and the pinion. No mark could be discerned on the cast-iron, but the nut was very plainly stamped on the steel, and the axle box was broken. One other point was with regard to gearless motors. These were scarcely ever of any use for street traction purposes; it was almost impossible to make a motor which had a satisfactory efficiency.

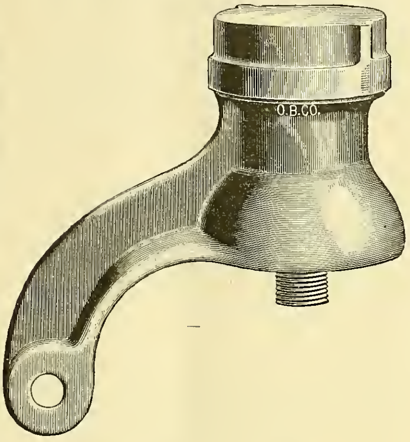

Fig. 4.—Single Curve Hanger.

* * *

New York Rapid Transit.—Thus, two months after the people voted for rapid transit, the whole business is in a worse muddle than it has ever been in before during the long period in which it has been discussed. No plans are settled, no routes are determined, the time for digging the underground tunnels is still in the remote future, if it ever come, and the hapless Commission is at its wits' end to find out how to go ahead! At last the hysterical excitement has cooled off, and the Commissioners are in a state of mind to look at the subject sanely.—*New York Sun*.

TROLLEY HANGERS.

In the accompanying illustrations are shown views of the new Type K hangers, made by the Ohio Brass Company, of Mansfield, O. Those shown are the straight line hanger in elevation and cross section, Figs. 1 and 2; the insulated bolt, Fig. 3, which is interchangeable with the different forms of hangers: and the single curve hangers, Fig. 4. The full line of hangers of this type includes all the varied styles necessary to support the trolley wire for the suspensions in general use.

The design and method of working resemble somewhat those of the well known "West End" type of hanger, but the details of construction and the proportioning of the metal and insulating parts have been changed, it is stated, so as to give increased electrical and mechanical strength when the weight is decreased. The hanger is made of three parts, viz., body, cap and insulated bolt. The latter is a $\frac{5}{8}$-inch dropped forged steel bolt with a heavy covering of insulated material molded around it, and thoroughly protected from moisture and accidental blows by the metal covering. The cap, which screws onto the hanger body, bears directly on a leather washer, which is interposed between it and the head of the insulated bolt, and thus holds it securely in position.

The design of the cap and threaded lip of the hanger body, which is peculiar to the Type K hanger, permits the screwing of the insulated bolt into the trolley wire support, without raising it from its normal position in the hanger body.

The hangers are furnished in malleable iron or bronze metal.

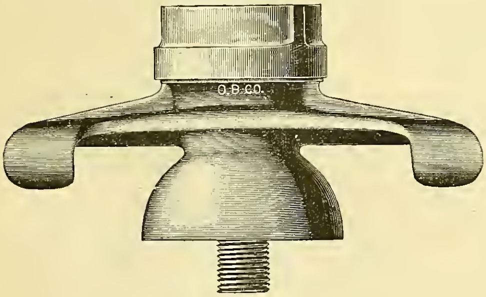

FIG. 1—STRAIGHT-LINE HANGER.

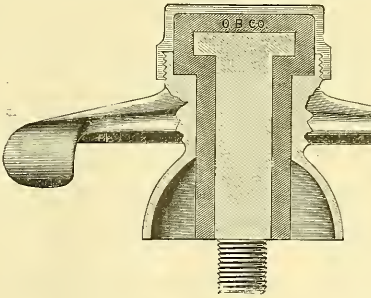

FIG. 2.—SECTION STRAIGHT-LINE HANGER.

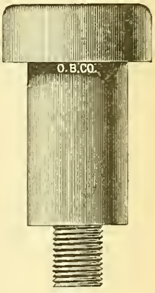

FIG. 3.—INSULATED BOLT.

* * *

A CABLE ACCIDENT.

A San Francisco paper tells a curious story of an occurrence that is always anticipated in cities where cable lines are operated, but that rarely happens. A lad who was a disciple of Buffalo Bill attempted to lasso a companion. The rope missed its object and, falling down the railroad slot, was caught by the cable. The boy could not let go the rope, as it was tied around his waist and, falling to the ground, was dragged along in most every conceivable shape. His screams and those of his companions attracted the attention of people, who hastened to overtake or head off the rapidly moving boy. The rope was fortunately severed by an overhanging pulley and the boy released from his perilous situation. He was badly bruised and his clothing much torn, but, recovering from his fright, he jumped up, stating to the assembled crowd that he was all right.

* * *

NEWARK FENDERS.

Mayor Lebkeucher has expressed his opinion of the fenders in use in Newark in the following terms:

"Our experience thus far leads to the belief that the adoption of fenders is a practical success. Before their adoption fatal accidents on the trolley lines were quite numerous, but since Nov. 1 no fatal accident has occurred in this city, and there have been several instances in which it is believed lives have been saved by their use on the cars."

CANADIAN NOTES.

(From our Special Ottawa Correspondent.)

Hamilton, Ont.—The annual general meeting of shareholders of the Hamilton & Barton Incline Railway will be held on Jan. 15.

Montreal, Que.—Mr. Price, a New York architect, will supervise the reconstruction of the collapsed street railway building which recently, through falling walls, killed several workmen.

Welland, Ont.—The Fort Erie Ferry Railway Company is applying for power to increase its stock to $150,000; to extend its tracks, and to operate its line with either steam or electric power.

Toronto, Ont.—The general annual meeting of the Toronto Electric Street Railway will be held for the election of directors, etc., on Jan. 23. The directors of the Niagara Falls Park and River Railway Company have made a call of 10 per cent. on the subscribed stock not yet paid up.

Ottawa, Ont.—The application to Parliament for a charter by the Quinze Electric Railway Company to build a line of electric railway in the Temiscamingne country will be opposed in Pontiac County, as it is believed the company is endeavoring to secure a monopoly which will keep out rival lines.

London, Ont.—The London and Springbank Electric Railway Company is applying to the Ontario Legislature for a charter to construct and operate an electric railway from London west to a point on the river Thames near Springbank with power to bridge the river. The promoters of the road are: G. E. Everett, E. W. Moore, T. H. Smallman and S. R. Break, all of London, Ont.

The Ontario government, pursuant to the provisions of "The Trades' Dispute Act," passed by the legislature of that province last session, has appointed a council of arbitration for the settlement by award in respect of disputes and claims between railway (including street railway) companies, and wage-earners employed in respect of railway construction or traffic on railways. Judge Senkler, J. D. Thompson, registrar of Frontenac, and Ed. Williams, locomotive engineer, of Hamilton, constitute the council.

NEW ENGLAND NOTES.

(From Our Special Boston Correspondent.)

The Fitchburg & Leominster Street Railway Company is to extend its tracks from North Leominster to Whalom Lake, to which another line direct from Fitchburg runs by another route. A good many people living along the route of the present track are asking for a reduction of the rate from 10 to 5 cents, although the president of the road declares it cannot be done.

The Lynn & Boston Railroad Company has been mulcted in heavy damages in two suits recently brought against it for personal injuries.

That grade crossing at Braintree is not likely to be made for the present, as the New York, New Haven & Hartford Railway Company has secured an injunction against the Braintree & Weymouth Street Railway Company, to restrain the latter from taking any further action in the matter.

During the last three years the Quincy & Boston Street Railway Company has extended its system to several neighboring towns, all of which have warmly welcomed the advent of electric cars. Being desirous of still further extending its system in directions thus far not reached, it has recently sought to construct a line to Milton, one of the most wealthy and exclusive towns in the State. In this effort, however, it has met with considerable opposition from the wealthy real estate owners.

The Newton & Waltham Street Railway Company continues in the enjoyment of quite a prosperous business, and is extending its system in various directions.

During the recent snowstorm there have been some lively encounters among the employees of steam and electric railways in Boston, arising out of the removal of snow. In some parts of the city steam tracks parallel electric tracks, and it sometimes happens that the employees of one road in removing snow throw considerable of it on the adjoining tracks. A few days ago a sanguinary battle was threatened, but it ended in a locomotive headed with a snowplow being brought into requisition, by means of which the offending snow was plowed onto the sidewalk, to become more offensive still.

COMMENTS AND VIEWS OF CONTEMPORARIES.

A NECESSARY ADJUNCT.—Efficient fenders are an absolutely necessary part of cars moved by machine traction.—*New York Sun.*

ACCIDENTS ON STREET RAILWAYS.—A current bit of humor represents two boys playing in a Brooklyn street. "Let's run across the street," says one. "Not now," replies the other; "there isn't a trolley-car in sight!" In this there is more truth than humor, as careful observers know. Many, if not most, of the accidents on the Brooklyn trolley lines have been due to the carelessness or recklessness of the victims.—*New York Tribune.*

AMERICAN CRITICS AND ENGLISH PROGRESS.—The American STREET RAILWAY GAZETTE says that 'if it is the English idea to postpone the construction of electric railways until all the problems have been satisfactorily solved, the British public will continue to ride in antiquated tramcars for generations to come." Fortunately, that is wide of the "English idea."—*London Electrician.*

RURAL ELECTRIC RAILWAYS.—It is practically a self-evident proposition that if capital has faith enough in electric power, as a motor for rural transportation, to invest in these country railroads, it should be permitted to make the experiment under proper conditions. The question what those conditions should be is the most important one, although the attempt to block the traction roads altogether may becloud and obscure that point.—*Pittsburg Dispatch.*

FENDERS.—Much has been said, by those who control street car lines, about the impossibility of procuring a fender that will throw human obstacles off the track without injury. We are quite willing to believe that both time and money have been freely spent by street car men in their endeavor to get a perfect fender. But a perfect fender not being forthcoming, it is the duty of these men to use the best fender at present procurable.—*New York Sun.*

RESULTS OF THE TROLLEY IN BALTIMORE.—By means of the trolley and cable car Baltimoreans move more quickly from point to point, and even the oldest and most conservative are stepping more lively than of yore. The jar upon life-long habit may not be pleasant in all cases, but the people of our city have learned that they must abandon old methods or be lost in the shuffle. The inspiration of the electric motor has permeated the whole fabric of social life; has set conditions to business activity, and has awakened Baltimore marvelously.—*Baltimore Herald.*

STREET RAILWAYS AND PROSPERITY.—Half a dozen years ago a New York capitalist went to Syracuse to make some investments. In front of his hotel a horse car stopped for 20 minutes and then began its return trip. The capitalist packed his grip and returned to New York, remarking that a town of 20-minute horse cars was not a place for his money. To-day Syracuse is threaded with trolley cars and has grown in population since then some 25,000. That same year another traveler stopped in Auburn one Sunday, and, after a morning walk, brought up at the top of Genesee street hill, a fashionable part of the town, and entered a horse car. After a quarter of an hour the conductor was asked when the car would start. "When church is out," he answered. The only Sunday cars were run to the churches and sent back when they closed.—*New York Sun.*

GRADE CROSSINGS.—One cannot expect a crossing teamster, looking up and down the track, to see an approaching train more than one-third of a mile away; upon most of our roads a bend in the track and a hill or a house will shut off the view much short of that distance; and yet a passenger train moving only at the ordinary rate of 40 miles an hour will cover this distance of one-third of a mile in 30 seconds. No trolley car filled with passengers should be subject to the possibility of collision under these circumstances; and there is always an added danger that some part of the trolley mechanism may get out of order at the critical moment and leave the car and passengers exposed. Moreover, if the steam railways have, as already suggested, acquired a certain equity in the crossing of country roads, by reason of long established custom, it is a violation of that equity to allow any greater danger at such crossings, particularly if the incurring of such danger is unnecessary.—*New York Evening Post.*

RIGHTS OF WAY FOR COUNTRY ELECTRIC RAILWAYS.—It would seem that the just and fair policy for the county authorities to pursue is to compel the electric roads to buy their right of way in rural districts, just as steam railroads are compelled to buy it, just as an electric railroad near Sandusky is now buying it. From choice this road, in which several Cincinnati capitalists are interested, keeps off the highway. It owns the property on which it runs and so escapes the losses it might incur from frightening or killing horses and, what is of far greater importance, escapes the everlasting annoyance of being dictated to by county commissioners, road supervisors, etc. What the electric roads of the country, entering actively into competition with steam railroads in carrying freight and passengers, want to do is to do as the Sandusky electric railroad has done. Then if a war of rates comes on between the electric and the steam roads, it cannot be charged that the State is the ally of one or the other.—*Cincinnati Times-Star.*

COUNTRY TROLLEY LINES.—Objections have been raised to rural trolley lines that their competition with the steam railways was unfair, inasmuch as the steam companies bought their land and pay taxes on their property, while the trolley companies are allowed to take possession of the common highway for their tracks without compensation. It is not of much practical use to argue this point, because the electric lines afford to towns and villages facilities which they could enjoy in no other way. It is also questionable whether the country trolley roads will not in the long run bring more travel to the steam railway than they take from it. Electric roads accommodate travelers who would not take the steam railways in any case, so that even when competing with steam roads by parallel lines, the electric companies, to use a transportation phrase, "create" traffic: moreover, the extension of such lines into sections of the country not reached by the steam railway is sure to bring more passengers to the main lines. So it is doubtful whether it would be wise for the steam companies to oppose the building of trolley lines even if their opposition would be successful.—*New York Evening Post.*

WHAT ABOUT THE TROLLEY POLE?—A motorman on an Arch street car unconsciously made a suggestion for an improvement of cars designed to stop at the near side of the street. During the recent storm his car stopped on the near corner, where sever ladies were waiting. To reach the back platform they would have had to wade through several inches of snow; but as they were directly opposite the front platform the motorman threw open the gate closing the platform, and admitted them through the front door. This entirely rational proceeding suggests that by slightly increasing the size of the front platforms they could be made the chief if not the only means of ingress and egress, and the conductor could be stationed there where he really belongs. At present, in case of an accident, the conductor, whose station is on the back platform, is always arrested, although he cannot possibly "conduct" the car from that place. If he is to be treated as responsible for the car, and not a mere fare-taker, he should be stationed on the front platform, and if the cars are to be stopped on the near crossing, the front platform should also be used to take on and let off passengers.—*Philadelphia Public Ledger.*

FINANCIAL NOTES.

Decatur, Ill.—R. H. Yates and C. F. Taylor, representing a Chicago syndicate of capitalists, were in Decatur considering the purchase of the City Electric Street Railway Company.

The Baltimore Traction Company has executed to the Maryland Trust Company, as trustee, a collateral mortgage trust loan for $750,000, to run five years and bear interest at five per cent. Under its terms coupon bonds of $1,000 each will be issued to the full amount of the loan.

Akron (O.) Bond Issue.—A $300,000 mortgage was filed last week by the Akron Street Railway Company to secure the issue of 6 per cent. bonds. The proceeds will be used for the construction of electric lines from Akron to Cleveland, Akron to Kent, and Akron to Barberton, a total of 57 miles.

Brooklyn Heights Directors Re-elected.—It was rumored in financial circles this week that some decided changes might result at the annual meeting of the Brooklyn Heights Railroad Company, of Brooklyn, N. Y. The report proved unfounded and the same board of directors was re-elected.

Binghamton (N. Y.) Comparative Statement.—The receipts of the Binghamton Railroad Company during the last six months of 1894 were $70,913.16, an increase of $13,258.84 over those of the corresponding period of last year. The gain was 23 per cent. The gain in net receipts was 32¾ per cent.

Kings County Elevated Directors.—The following directors of the Kings County Elevated Railroad Company have been elected: Edward A. Abbott, August Belmont, James R. Carter, James H. Frothingham, James Jourdan, William A. Read, James O. Shelden, S. Newton Smith, and Henry J. Robinson.

Harvey (Ill.) Plant in Trouble.—The entire waterworks, street car and electric light plants of the town of Harvey are involved in the financial difficulties of the Harvey Transit Company. The various plants now owned by Chicago capital will, in the event of a receiver being appointed, become the property of Eastern bondholders.

Tacoma (Wash.) Railway Sold.—The Point Defiance Street Railway in Tacoma has been sold by the sheriff for $82,000. It was bid in by Judge Paxton, of Portland, attorney for S. Z. Mitchell, of the same city, who represents the General Electric Company. The sale was on a foreclosure of mortgage by Charles S. Hinchman, of New York.

Application for Receivership.—Application has been made for a receiver of the Electric Railroad Company, of Savannah, Ga., by Judge Palmer, of Atlanta, who represents a Massachusetts bondholder. The value of the property is placed at $500,000, and it controls 19 miles of road. A cut in fares to one cent has been in effect since last summer, to meet the rate of the City and Suburban line, controlled by George H. Parsons, of New York.

Sale of Fond du Lac Property.—The steam plant, power-house, lands and street railway of the Fond du Lac Light, Power and Railway Company were sold at sheriff's sale last week on a judgment of foreclosure on mechanics liens to Elihu Colman, of Fond du Lac, for $4,687.82. The plant is mortgaged for $150,000 to the St. Paul Trust Company. It is announced that the plant will be placed on a solid and permanent financial basis and again operated by President De Celle.

Railways Purchased.--The Highland Avenue & Belt Railroad, of Birmingham, Ala., has been purchased by the Columbian Equipment Company, of 66 Broadway, New York, and among the improvements to be made in the property will be the equipment of the Highland Avenue line with the trolley system. The Columbian Equipment Company have also purchased the Gate City line in the city of Birmingham. The officers of the Columbian Equipment Company are Wayland Trask, president; Charles A. Avery, vice-president; Clarence E. Stump, secretary and treasurer.

Brooklyn Elevated Directors.—At the annual meeting of the stockholders of the Brooklyn Elevated Railroad last week Adolph Ladenburg, Edward Lauterbach, Leonard Lewisohn, Simon Rothschild, Jacob Scholle, Henry Seidenberg, Elbert Snediker, Simon and Frederick Uhlman, George W. Wingate, Elisha Dyer, Jr., William Pond, Jr., and Emil Schaffer, Jr., were elected directors. Austin Corbin, Anthony Barrett and Albert L. Drake withdrew from the directory. The new board organized by electing Frederick Uhlman, president; George W. Wingate, vice-president; Elisha Dyer, Jr., secretary and treasurer. Mr. Barrett's withdrawal was a surprise. He has been practically managing the road for a year.

Philadelphia and Pennsylvania Traction Co.'s—The traffic agreement which has been made between the Philadelphia and Pennsylvania Traction companies is one of the most important deals recently consummated. It will be particularly beneficial to President Widener's company, as the traffic received from the Pennsylvania will not only be new traffic, but traffic on which an entire profit will be made; and so the Philadelphia Traction will incur little expense in effecting a connection with the Pennsylvania's lines. To make this connection the Philadelphia Traction Company will build a double track line from Sixty-third street to the county line. Here it will connect with the Pennsylvania Traction line, at its depot, and distribute passengers to all parts of Philadelphia.—*Philadelphia Stockholder.*

Chicago Transportation Facilities.—There has never been a year in the history of Chicago, and few in the chronicles of anywhere else, in which such enormous sums have been expended for the inter-urban transportation of the population. Elevated roads alike with surface lines have been planned and put into practical effect. The sum of expenditures incurred by the various new and old companies shows a total of many millions of dollars. A remarkable feature of all this improvement is the extension of electricity as a motive power. So generally has it been taken up by the surface companies that not a single street car will be drawn by horses in Chicago within a year. Cable traction has its supporters yet, however, especially in such lines as touch the downtown district.—*Chicago Tribune.*

Electricity and Real Estate, Chicago.—The adoption of electricity by the surface railroads and the construction of the Metropolitan Elevated brought about a great deal of construction, particularly in the line of power-houses. About $830,000 has been expended in building alone. The West Chicago Street Railway is about completing the construction of a power-house at 47 Western avenue at a cost of $120,000. The same company is also completing a carhouse at 1991 to 2003 West Madison street to cost $70,000. The Chicago Electric Transit Company is building one of the most extensive power plants ever designed at Roscoe Boulevard, California avenue and the North Branch of the Chicago River costing $200,000. The same company is building a two-story barn at Elston and Warner avenues. The Metropolitan Elevated is building a powerhouse at 143 to 145 Loomis street at a cost of $200,000; also a two story and basement repair shop at 140 to 146 Throop street at a cost of $30,000. In addition to this, the same company has so far expended approximately $150,000 on stations. The Chicago General Railway Company has built a power-house at Thirty-first street and Kedzie avenue at an approximate cost of $40,000, and a carhouse at the same place at a cost of $20,000.—*Chicago Evening Journal.*

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NEW INCORPORATIONS.

Tillamook, Ore.—The Tillamook Electric Railway, Power & Light Company has been incorporated with a capital stock of $500,000. The promoters are W. H. H. Cary, Davis Hess, Wm. Squires, Tillamook, Ore.

Clayton, Mo.—The St. Louis & Jefferson Barracks Street Railway Company has been incorporated, with a capital stock of $30,000. The promoters are C. Kilpatrick, W. R. Davis, Jos. S. Minary, all of St. Louis, Mo.

Chicago, Ill.—The Loop Construction Company has been incorporated with a capital stock of $1,000,000, to construct elevated and electric railroads. The promoters are Douglas Hotchkiss, Geo. E. Newlin, Wm. H. Johnson.

Rochester, N. Y.—The Charles F. Burns Company has been incorporated with a capital of $5,000 to manufacture and sell supples for electrical railways. The promoters are: C. F. Burns, E. M. Higgins, Alfred Creen, all of Rochester, N. Y.

Jersey City, N. J.—The Homan Manufacturing Company has been incorporated. The capital stock is $100,000, and the company will manufacture a wheel fender and safety attachment for street cars. The promoters are Frank C. Johnson, Frank H. Homan, Chas. L. Steele, Brooklyn, N. Y.

Elyria, O.--The Elyria, Oberlin & Wellington Electric Railroad Company has been incorporated with a capital stock of $ 00,000 to construct an electric railroad between Elyria, Oberlin and Wellington, and to furnish electric light, heat and power, etc. The promoters: A. R. Webber, W. A. Braman, R. T. Reefy, W. B. Bedoitha, Chas. A. Metcalf.

Glens Falls, N. Y.—The Horicon Improvement Company has been incorporated with a capital of $150,000. The company proposes to build a cable road at Lake George to the top of Prospect Mountain, a distance of 72,000 feet, and will own and conduct the Lake House Hotel at Lake George and build and maintain cottages on the Lake House grounds. The directors are Walter M. Peck, Harry M. Peck and State Treasurer A. B. Colvin. All are of Glens Falls, where the company will have its principal business offices. Mr. Colvin says that associated with the directors in the enterprise are the proprietors of the Otis Elevator Company, of New York city, who will shortly be added to the company's directors. The company has already started 50 men at work building the road.

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NEWS OF THE WEEK.

Brooklyn, N. Y.--Joseph Sachs lectured on electric conduit railway systems before the Brooklyn Institute, Jan. 4.

Wilkes-Barre, Pa.—The time for building the electric railway on the Heights has been extended to November 1, 1895.

Crawfordsville, Ind.—A proposition for the construction of an electric railway has been submitted to the council by Noah Cladfelter.

Philadelphia, Pa.—A controlling interest in the stock of the Frankford & Oxford Turnpike Company has been secured, it is announced, by a syndicate friendly to the Electric Traction Company.

St. Louis, Mo.—The Southern Electric Railway Company has filed a petition in the County Court at Clayton asking for the right to construct a street railway from St. Louis to Jefferson Barracks.

Atlantic City, N. J.—Promoters of a trolley line, to run on South Carolina avenue, from the Beach to Arctic avenue, and thence along Arctic eastward to the Inlet and westward to Chelsea, have asked for a franchise.

Hartford, Conn.—The directors of the Hartford, Manchester and Rockville Tramway Company have practically decided to establish an independent power station, and a committee to take action toward that end has been appointed.

Yonkers, N. Y.--The Electric Railroad Company is making preparations to introduce a system of automatic block signals on its Mount Vernon line so as to prevent collisions on the sharp curves, of which there are several on that line.

Charlottesville, Va.--The contract for building the electric street-car house for the Piedmont Construction and Improvement Company at Charlottesville has been awarded to the Vandergrift Construction Company, of Charlottesville.

Brooklyn, N. Y.--A trolley car mail route between the Brooklyn, N. Y., Post Office and Flatbush and Flatlands, L. I., has been arranged and went into effect on Jan. 3. The route is over the Brooklyn City Railroad Company's Flatbush avenue line.

Camden, N. J.—The Camden Horse Railroad Company, within the next few months, expects to have a branch trolley road in operation between Camden and Haddonfield. The right of way for the new route is on private ground, and has been donated by the owners of the land to the company.

Muscatine, Ia.—Thirty employees of the Muscatine Electric Railway struck last week against a reduction of the wages of the motormen. About six applications were made for every vacancy, and all cars were running as usual on the following day, all but ten of the old employees returning to work.

Philadelphia, Pa.—Mayor Stuart has vetoed the ordinance permitting the Philadelphia Suburban Passenger Railway Company and its lessees, the Philadelphia Traction Company, to construct trolley lines in the Twenty-first, Twenty-second, Twenty-third, Twenty-eighth, Thirty-third and Thirty-fifth Wards.

Bangor, Me.—The stockholders of the Bangor, Orono & Old Town Railway Company have voted to accept the proposition of the Worcester Construction Company to build its road. This company is represented by George E. Macomber, of Augusta, and A. F. Gerard, of Waterville. The road will be in operation on or before August, 1895.

New York, N. Y.—The grand jury last week handed in a presentment arraigning the surface railroad companies for obstructing traffic by piling up alongside the tracks snow which they removed from between the rails. The presentment requests that the Court call the attention of the railroad companies to this matter and have it stopped.

Newark, N. J.--One of the cars on the Consolidated Traction Company's line running from Jersey City to Newark collided with a truck recently. When he was put under arrest the motorman was found to be so drunk that he was scarcely able to stand. The man was fined $10 in the police court and was also discharged from the company's employ.

Philadelphia, Pa—Select Councilman Ryan, Chairman of the Sub-Committee on Fenders of the Street Passenger Railway Committee of City Councils, will report an ordinance to Councils at the next meeting, providing for efficient fenders on all trolley cars. It is not the intention of the committee to recommend or specify any particular make of fender.

Newington, Conn.--It is now practically decided that the road to be built by the Central Electric Company through this place, connecting New Britain and Hartford, will take the route surveyed through the center, passing the corner, thence through the lots to the road running under the mountain. The road is expected to be completed early next summer.

Brooklyn, N. Y.—Through the breaking of a loose or rotton buffer a Kings County Elevated Railroad engine crashed down into the street at 7:35 o'clock Thursday morning, taking a car with it. The accident occurred at Snedeker and Liberty avenues, and was the first serious one since the construction of the line. The engineer was injured and the fireman was killed.

Brooklyn, N. Y.—Police Commissioner Welles has distributed tickets to the captains, which will be received from policemen by the surface and elevated railroads in lieu of fares. They are to be used only when the men are on duty. The payment for the tickets will depend on the result of the suit to determine whether policemen are included in the constitutional prohibition.

Atlantic City, N. J.—The report that the Pennsylvania Railroad will soon construct a trolley line from Camden to Atlantic City, connecting all towns and villages along the line, is confirmed by Supt. W. McAllister, of the local trolley line. The new road will be built before next summer, and will follow the roadbed of the Camden & Atlantic. Engineers of the Pennsyvania Railroad, it is announced, are now investigating the electric railway systems. It is proposed to build the road to sustain frequent and swift traveling. It is likely that water power will be utilized for the operation of the road.

Seneca Falls, N. Y.—A compromise has been effected between the railway companies at Seneca Falls. The Waterloo, Seneca Falls & Cayuga Lake Company has given bonds to C. T. Silsby to run the road from Cayuga Lake Park to Orchard Beach, fare to be the same to both points, with same excursion rates, and if the Orchard Beach Company decides to run a direct road west to the village on Bayard street it is to have the privilege of the rails of the other company. This agreement, it is probable, removes every obstacle in the way of the construction of a surface road at Seneca Falls to Cayuga Lake, except the granting of a franchise by the village trustees and highway commissioners.

Chicago, Ill.—The Milwaukee avenue branch of the Chicago Electric Transit Company's lines was operated last week for the first time. Trains were eagerly patronized by people going to work downtown in the morning from the district stretching out to Avondale, and returning from work at night. The Milwaukee avenue branch is but one of the many lines to be operated by this company. The Elston avenue line was opened two weeks ago yesterday and the Southport avenue the next day. Altogether there are 16 lines to be operated. Two immense power-houses are in course of construction by the company. One is almost completed at Avondale on Roscoe street, between California avenue and the river, and the foundations for the other are being laid at Washington boulevard and Western avenue. These houses are two of the largest of their kind in the world. The one at Avondale is an immense structure, covering an area of 245 by 126 feet, and the one on Western avenue will be even larger. That at Avondale is to have an addition of 200 feet in the length of it when all the roads are in operation.

Trenton, N. J.—The New York & Philadelphia Traction Company will apply to the Common Council of Trenton next week for the right of way through the streets of Trenton not now covered by the rails of the Trenton Passenger Railway Company. The intention is to connect the city trolley lines at streets which will mark the terminus of the through lines to Bristol, Philadelphia and New York and Camden on the north and south ends. The company filed the maps of the routes for which it has now applied with the Secretary of State of New Jersey when it took out its charter in July last, thereby securing them to the company, but had taken no action in the matter of securing the franchises from the city until now. The New York & Philadelphia Company has made rapid progress toward construction in the past few months. It has secured practically all its right-of-way over half its franchises, and has the rest in good shape. President Frank A. Magowan says the contracts for construction will soon be let, and some have already been closed. Work will be commenced at once between New Brunswick, Bound Brook and Somerville, and is about to be started between Trenton and Princeton and Bound Brook, and Plainfield and Elizabeth. The construction of the Philadelphia and Camden lines will begin when the other lines are under way. It is said that arrangements have been made for underwriting $10,000,000 of the company's bonds, which will build the entire system, embracing over 200 miles of main line and branches.

PERSONALS.

Mr. John J. Ostrom, of the Pennsylvania Steel Company, Philadelphia, was in New York this week.

Mr. Allan Rogers, superintendent of the cable line on Montague street, Brooklyn, has resigned his position.

Mr. Charles B. Thurston, president of the Jersey City & Bergen Railroad Company, of Jersey City, N. J., has severed his connection with the Consolidated Traction Company.

Mr. Willard Elliott, superintendent of the Pittsburg & Birmingham Traction Company, has tendered his resignation. He is to be succeeded by Mr. McCoy, of the Allegheny Traction Company.

Mr. F. P. Little, of the F. P. Little Construction Company, of Buffalo, N. Y., died in Buffalo on Sunday last, from the effects of an operation which he underwent about the middle of last December. Mr. Little had many friends throughout the country, especially among the electrical fraternity, who will regret to hear of his death.

TRADE NOTES.

The Sterlingworth Railway Supply Company, of New York, is favoring its patrons and friends with a neat pocket bill-book, made of fine canvas bound with leather, on the inside of which is a conveniently arranged erasable memorandum tablet.

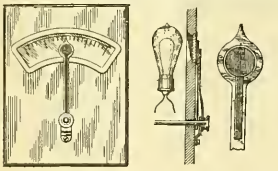
New York Insulated Wire Company.—Mr. James F. Kelly, formerly of the United States Wire and Cable Company; Mr. H. C. Whitney, late of the Crocker-Wheeler Company and Interior Conduit Company; Mr. P. H. Hover, well known through his connection with the Standard Paint Company; Mr. L. O. Brewster, formerly New York manager for Almon & Sergent, of Boston; and Mr. Harry Gue, late of Tucker & Gue, have all become associated with the New York Insulated Wire Company.

New Contracts of the Berlin Iron Bridge Company.—The new car barn of the Lehigh Traction Company, at Hazleton, Pa., is to be built by the Berlin Iron Bridge Company, of East Berlin, Conn. The same company have a contract for the new power-house for the Keene Gas Company, at Keene, N. H. The same company is putting up a large iron bridge at Collinsville, Conn. The new power station of the United Electric Light and Power Company, on West Twenty eighth street, New York, is now being put in place by the Berlin Iron Bridge Company. This will be a model station and one of the most complete and perfect in the Eastern States. The engine and dynamo room is 100 feet square, and the boiler room 60 feet by 100 feet. The roof covering of the dynamo room is to be the Berlin Iron Bridge Company's patent anti-condensation corrugated iron. The coal pockets in the boiler room will have a storage capacity of 3,000 tons of coal.

RECORD OF STREET RAILWAY PATENTS.

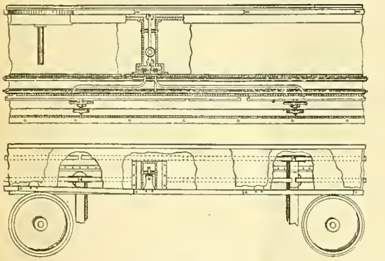
U. S. Patents Issued Jan. 1, 1895.

531,626. Car-Fender; William A. Donor, Jersey City, Assignor of one third to Michael J. O'Keefe, Paterson, N. J. Filed Oct. 6, 1891. This is a fender capable of lateral movements, actuated by levers. The front part is hinged to the main body, and is capable of vertical movements, actuated by springs in combination with a spring extending around both sides and in front of the hinged portion and secured to projecting arms thereon.



No. 531,669.

531,664. Closed Conduit for Electric Railways; Robert J. Turnbull, St. Paul, Minn., Assignor of one-half to Augustus F. Priest, same place. Filed Jan. 19, 1894. The conduit is formed in two parts adapted to be united longitudinally, a conductor rail formed in sections and held between the parts of said conduit projects downward into the interior thereof, and extends above its upper surface.



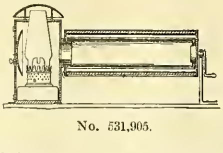
No. 531,873.

531,669. Indicator for Electric Currents; Edward Weston, Newark, N. J. Filed Feb. 21, 1894. The pivoted index arm has an opening, and a second arm is pivoted concentrically with the index and carries a disk or plate of less area than and disposed before said opening, means being provided for adjusting and holding the second arm in definite position. (See illustration.)

531,707. Brush for Dynamo-Electric Machines; John B. Wallace, Ansonia, Conn., Assignor to the Wallace Electric Company, of Illinois. Filed April 30, 1891. The brush consists of a body of gauze or cloth composed of a good conducting material with an inclosing or surrounding wrapper of gauze or cloth of a high resistance substance or material.

531,790. Method of Operating or Controlling Electric Motors or Dynamos; Rudolph Eickemeyer, Yonkers, N. Y. Filed Nov. 2, 1891. This is a method of adjusting electric motors for operation in either direction, and consists in adjusting all electric connections with the armature, and field coils, in a fixed or non-variable condition for supplying electric currents unvariable as to direction, and then adjusting the direction of magnetic flow to and from the armature, by axially varying the position of a mass of iron occupied by the magnetic circuit, and thereby directing the magnetic flow toward the armature which will be required for causing the motor to be driven in the desired direction, without regard to the direction of the electric currents in the their several circuits.

531,837. Trolley; Theodore Cooper, Providence, R. I. Filed Sept. 17, 1891. Serial No 523,198. (No model.) The side-plates of the trolley wheel have annual recesses in their inner surface, outwardly-beveled edges and central openings. The annular contact has edges adapted to be seated in the recesses of the side plates and inwardly-extending arms, and an oil reservoir, extending through the central openings of the side plates, for securing these plates together.

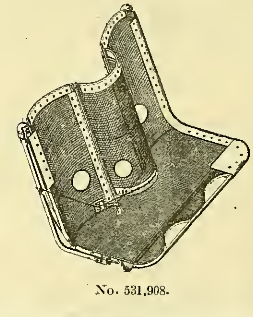


No. 531,905.

531,839. Safety Guard or Fender; Philip Elsworth, Jr., Bayonne, N. J. Filed Sept. 1, 1894. This is a scoop or receptacle capable of oscillation, and comprises curving arms pivoted between their upper ends and middle in depending arms or brackets, and a suitable filling. Springs, normally at a tension, extend from the upper ends of the scoop rearwardly beneath the car, and spring-retracted hooks normally overcome the tension.

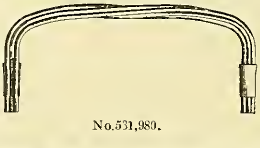
531,873. Electric Railway; Abraham A. Shobe and William Embley, Jerseyville, Ill. Filed July 24, 1891. Junction boxes are provided, each of which comprises a lever fulcrumed in the sides of an inclosing chamber, the lever having jointed to one end thereof a vertical arm, and to the opposite end a vertically sliding block of insulating material having in the face thereof bars adapted, when the said sliding block is actuated, to alternately close and open the electric circuit. A jointed bar is supported upon the upper ends of the arms, and located in a slot by the side of a rail, and bar adapted to be depressed by a flange provided for that purpose on one of the car wheels, as the latter passes over it, so as to actuate the mechanism in the junction boxes. (See illustration.)

531,905. Illuminated Street Car Sign; William H. Carroll, Jersey City, N. J. Filed Oct. 6, 1891. The casing is adapted to receive a lamp and has an aperture in its wall. A slotted trunnion is arranged adjacent to the lamp casing and has an aperture formed through it corresponding with the aperture in the wall thereof. A tubular sign has one end provided with a bead journaled in the bracket and its outer end provided with a tubular head adapted to turn on the apertured trunnion, a trunnion being located at the opposite end of the tubular casing. A reflector has ring-shaped heads formed at its ends encircling the trunnions, one of said heads having a lug which projects inwardly and is adapted to engage the slot in the apertured trunnion. (See illustration.)



No. 531,908.

531,908. Street Car Fender; Matthew A. Cherry, Washington, D. C. Filed Oct. 3, 1894. The platform has a sinuous frame bar at its forward portion, and a yielding guard forward of the bar. (See illustration.)



No. 531,980.

531,980. Electric Rail Bond; George E. Somers, Bridgeport, Conn. Filed May 7, 1894. The bond consists of a series of strands of wire laid together and retained in place by ferrules through which the ends of the strands are passed, the upper ends of the ferrules being pressed into the strands so as to lock the ferrules thereto and secure the strands together, and also to provide tapers at the lower ends, which are adapted to engage the rails in setting the bond up to place. (See illustration.)

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As the STREET RAILWAY GAZETTE is published 52 times a year, and is the only weekly publication devoted to Street Railway Interests, its value as an advertising medium will be apparent to Manufacturers and Dealers in Street Railway Apparatus and Supplies of every description. We will take pleasure in quoting rates for advertising space.

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Trolley System in Chicago.

The street railway companies of Chicago did not take kindly to the trolley system at first, but it is evident from the annual reports published elsewhere in this issue that there is now in the boards of directors no lack of appreciation of electrical operation. All three of the great companies are now spending vast sums of money in equipping auxiliary lines for the trolley system, and it will not be long before animal traction will disappear for good.

Trolley System Needed in England.

During the last few months there seems to have been developed an extraordinary interest in electric traction in England. Societies have begun to discuss the subject with an interest that has never before been manifested. We print elsewhere in this issue a paper by Mr. Holroyd Smith, in which some of the causes which have retarded the progress of the trolley system on the other side are pointed out. It is an interesting statement, and it is of a character to cause the American street railway man and the American electrical engineer to experience considerable self-satisfaction.

Cars for Trolley Parties.

Within a few weeks the season of the trolley party will be at hand, and companies will be called upon to furnish special excursion cars. Equipped with the experience gained last summer managers will be able the better to provide for this new department, which in certain places is likely to prove very profitable. Eventually many companies will keep on hand special cars for this particular service, as the West End road of Boston does at the present time, and it is possible that some such car as that shown in our illustrations of the electric road at Hobart, Tasmania, may prove advantageous for this class of traffic. They are the ordinary double-deck car, but rather light in construction. It is true beyond all question that a double-deck car would prove far more popular for trolley parties than any form of open car. Passengers can ride in the open air, and yet can always have shelter at hand in case of rain or a sudden change in the temperature. There is no doubt about the popularity of the double-deck car, and if it could be built lighter it would doubtless come into more common use on suburban lines where low bridges are not encountered.

Better Carhouses Needed.

The result of housing electric cars in a building that is far from fireproof is again illustrated by the destruction of a large car barn in Boston. Enough rolling stock for the operation of a road in a city of considerable size was ruined by fire in less than an hour. Employes were present when the flames broke out, but they were unable to save any considerable part of the property, as the fire spread with too great rapidity, and apparently no facilities were available for running the cars out hastily. It would appear to be a wise course to construct car barns of fireproof materials, or at least to make them of such a character that they may be classed as slow-burning structures. It is quite likely that quite a number of companies would find it a wise policy to tear down some of the fire-traps in which their cars are housed and built modern structures in their place. With some large companies the loss of a single car barn and its contents is not a matter of serious inconvenience, but a loss such as the West End sustained would absolutely cripple the service on most roads in the country. Until modern barns are constructed better facilities for the quick removal of cars in case of an emergency should be provided.

The Strike in Brooklyn.

The Brooklyn street railway companies have been involved this week in a strike of tremendous proportions. The power of organized labor was exerted to the utmost, and at the word of an irresponsible executive committee the city was deprived in an instant of almost all surface transportation facilities. If the strike had had for its object the increase of wages as seemed to be the general though incorrect impression, there would be little to say regarding it. If the companies were able to grant an advance in pay, we certainly would be glad to see them pay it and settle the widespread trouble. We believe in higher wages for men in charge of electric cars. Their position is one of much greater responsibility than was that of employees who controlled the horse cars. Especially must the motorman be a person of far greater skill than the driver; he must exercise more intelligent judgment if he is to keep out of trouble. His compensation should be increased, and we think it will be found a wise policy for companies to pay good wages to the men who manage electric cars. But in Brooklyn the question of pay seems to be one of secondary importance; the matter of increased pay was tacked on to the list of demands, with the idea that it could be thrown out as a concession when attempts at compromise were made. What the union appeared to wish to gain by the strike was to secure the right to regulate the number of extra cars; to determine how many men should be regulars and how many should be trippers. This matter the companies hold is one that they must determine, if they are to manage their own business; and in this contention they are beyond all question correct. Concessions to the union are all right up to a certain point, but when the organization insists upon interfering with the details of management the line must be drawn. Then a company must revolt against the tyranny of the labor union. If the concession demanded in Brooklyn were granted, the companies claim that they could manage their roads to the satisfaction of neither themselves nor to the public. The strikers have exercised admirable self-control and have engaged in few acts of violence. They have realized that public sentiment is a mighty factor in the settlement of controversies of this character, and they have wisely refrained from engaging in lawlessness that would cause them to forfeit public respect.

STREET RAILWAY STRIKE IN BROOKLYN.

The strike which has been predicted for weeks in Brooklyn was finally declared on last Monday, and the city was deprived almost entirely of surface transportation. Out of 48 electric lines in the city, 45 were tied up. The companies whose employes struck were the Brooklyn Heights Railroad Company, the Atlantic Avenue Railroad Company and the Brooklyn City & Newtown Railroad Company. The employes of the Coney Island & Brooklyn Railroad Company, of which H. W. Slocum is president, decided at the last moment to retain their positions. The total number of men who struck, was about 5,000.

It is not easy to determine the causes which precipitated the strike. Several demands were made upon the companies; that for an increase in pay from $2 to $2.25 per day, although the one which attracted the greatest publicity, was not the one which the men insisted upou with the greatest vigor. The great point at issue was the regulation of the trippers; the men want to determine how many cars shall be regular and how many shall be extra. This matter the companies claimed should fall to them for control.

Perhaps the best idea of the differences of opinion that caused the strike is to be found in the dialogue between Master Workman Connolly and Daniel F. Lewis, President of the Brooklyn Heights Company, that occurred at a conference arranged by State Arbitration Commissioner Feeney. Mr. Connolly was the spokesman for the men, and Mr. Lewis spoke for the railway companies.

Mr. Connolly said that if the company was willing to take off the extra trips it had put on, the men would be willing to waive the demand for the increase in their wages.

Mr. Lewis—How can these extra trips be taken off without increasing the expenses? Don't you know that if the trips had not been increased electricity would never have been introduced? These electrical appliances all increased the expenses of the company. We have not got any money which would justify a dollar increase in the expenses. The company will not and cannot increase the wages of the men employed in the electrical work. As to the motormen and conductors we cannot give the regular men more than $2 a day and the trippers more than $1.50—absolutely nothing. You can take that for my final answer. I don't say this for fun. We will not enter into any agreement increasing our expenses for 1895 over those of 1894, simply because we cannot.

Mr. Connolly—Are you prepared to give us last year's terms?

Mr. Lewis—I can only say in answer that in the aggregate we can't increase last year's expenses.

Mr. Connolly—The men are just as firm and say they will not under any circumstances accept these terms. If you say you will take off these extra trips the question of wages will not be considered.

Mr. Lewis—Am I to understand that this committee is going to dictate to the company what men it shall employ and not employ?

Mr. Connolly—Oh, no; if a man spends five or six years learning a trade, it often happens that he can't get anything to do; capital takes advantage of him and freezes him out.

Mr. Lewis—I think we should be the best judges as to whom we should employ. Suppose a man comes here and is willing to work for a small amount to learn the business, should he not have some show?

Secretary Bogardus (Brooklyn Heights Co.)—This company has always stuck by its men. It doesn't require a skilled mechanic to handle a motor. It is our policy to take the men employed on the road and advance them.

Mr. Lewis—We can't change these rates of wages, but if this Executive Board is willing and authorized to discuss this matter I can make some suggestions.

Mr. Best (Executive Committee of District Assembly)—The committee has the power to make a full agreement.

A long discussion followed on the proposition of Mr. Lewis to increase the trippers.

"I want to do something," he said, "which will benefit the extras, accommodate the public, and retain the wages of the regular men and trippers just where they are to-day—at $2 and $1.50. We are not going out of business, as we would be compelled to do if we agreed to the demands which have been made. We have got to make our time

(Continued on Page 28.)

PENNSYLVANIA STREET RAILWAY LAW.

The Supreme Court of Pennsylvania has handed down a decision in the case of the Homestead Street Railway Company against the Pittsburg Homestead Street Railway Company, which involved a construction of the street railway act of 1889. The decision of the lower court in favor of the plaintiff is reversed, and the bill of complaint is dismissed.

The contention between the companies arose over the right to lay a track upon a highway in Mifflin township.

The Homestead Street Railway Company was chartered Nov. 29, 1893, and a municipal grant to it for the laying of the track was made Nov. 20, 1893. The Pittsburg & Homestead Electric Street Railway Company was chartered Nov. 16, 1893, and obtained its municipal grant to lay its tracks on the same highway on Dec. 19, 1893. The Homestead company filed a bill in equity, asking for an injunction to restrain the Pittsburg & Homestead Company from laying its tracks on this highway, and the latter company challenged the grant by the municipal authorities on the ground that there was no such company in existence as the Homestead company when the grant was made.

In deciding the case Justice Green, of the Supreme Court, held that, under the act of 1889, there can be but one street railway franchise upon the same highway, and that the statutory power of a corporation can only be executed in favor of a company which will construct and operate a railway on a street or highway upon which "no track is laid or authorized to be laid" under an existing charter, and that the act contains the same prohibition in relation to extensions and branches. The 15th section, by imposing upon street railway companies the duty of obtaining the consent of the municipal authorities to the occupancy of their streets, placed it within the power of the local governments to absolutely prevent the obstruction of their streets by refusing their consent to such occupancy, so that if a second occupation should be proposed the authorities could stop it immediately by simply refusing their consent.

The manifest and consistent purpose, Justice Green says, is to prevent the occupancy of the public highways by more than the track or tracks of one street railway company. By the expression "any existing charter" is meant only charters existing at the date of the passage of the act. Incorporation is prohibited if at the time it is sought there is a track down, or any outstanding authority to lay a track. On Nov. 16, 1893, when the defendant company obtained its charter, there was no track laid, and no outstanding authority in the plaintiff to lay a track, as it then had no corporate existence. Nor had it even municipal consent, which was not given until Nov. 20, and that consent could not possibly antedate the day of its birth. Municipal consent alone could not suffice to create a right to lay a track without being joined with a corporate existence, possessing a proper franchise, and, the judge said, it was more than doubtful whether the municipal consent could be obtained prior to actual incorporation.

The Court below held that the plaintiff had a right to construct its road, but that the right was not exclusive, and the defendant was also entitled to construct its road.

FENDER TESTS IN PHILADELPHIA.

The sub-committee on fenders of the Philadelphia City Councils witnessed a test of a number of these devices last Tuesday. There was a good representation of Councilmen, and among the street railway men present were: George D. Widener, second vice-president, and Chief Engineer Uhlenhaut, of the Philadelphia Traction Company; President Sullivan and Chief Engineer Ives, of the Electric Traction Company; Master Mechanic Wampler, of the People's Traction Company; President Hopkins, Vice-President Blum, Chief Engineer Johnson, and all the directors of the Hestonville, Mantua & Fairmount Passenger Railway Company.

Fourteen or fifteen different fenders were tried, all but two of which were attached to cars of the Philadelphia Traction Company. It appeared that probably half of those tested would be better than none at all.

The first test was made with a new style known as the Kurtz, consisting of a projecting pilot-like fender in front of the car, which, on touching an object, causes iron chocks to drop in front of the front wheels of the car, so as to stop it at once. On one trial the car was stopped in about six feet after the chocks dropped, but on another trial the chocks, car, and all slid more than a car length.

The Standard, a projecting pick-up fender of wire net, with a thick rubber edge, picked up a young man three times while the car was going at the ordinary rate of speed at which a car runs on the street. The young man stood on the track and was caught unhurt. The Robins fender, one of a similar character, which was attached to a car of the Electric Traction Company, picked up a boy successfully. This fender is being placed on the Lombard and South street cars.

The Goff fender, one of the projecting pick-up class, and the Dual were successful in a measure. The canvas dummy was not used in the trials of the fenders just mentioned, as they are not intended to pick up a prostrate body.

The Owens automatic, which is provided with a trigger that drops a scoop or basket, and two styles of the Crawford fenders were partially successful.

BOSTON CAR BARN BURNED.

The car barns of the West End Street Railway Company at the corner of Columbus avenue and Camden street, Boston, were destroyed by fire last Thursday night. Fifty electric cars were burned up or badly damaged, beside the building, the total loss footing up $135,000.

The building, was a nearly square, one-story shed, 125 ft. front on Columbus avenue and 150 ft. deep. It was used as a storehouse for the cars on the Columbus avenue lines, and had a capacity for 68 cars.

When the fire was discovered the few employes in the building made a rush for the sheds and tried to run out some cars. A few were saved, but the work was too slow to be effective.

There were about 60 cars inside the building, about a dozen of which were saved. Of the remainder, many are a total wreck, and what have been spared destruction are so badly burned that a total reconstruction will be necessary.

The rear half of the building was filled with 35 open summer cars, stripped of their motors, and valued at $1,000 each. Twenty-five of the box cars run the loss up to over $125,000 on cars alone.

The burned building has been used as a carhouse for several years. It was erected by the company when the carhouse on Tremont street became inadequate, about five years ago, and the Columbus avenue and Back Bay cars were housed there.

PHILADELPHIA CONSCIENCE FUND CONTRIBUTOR.

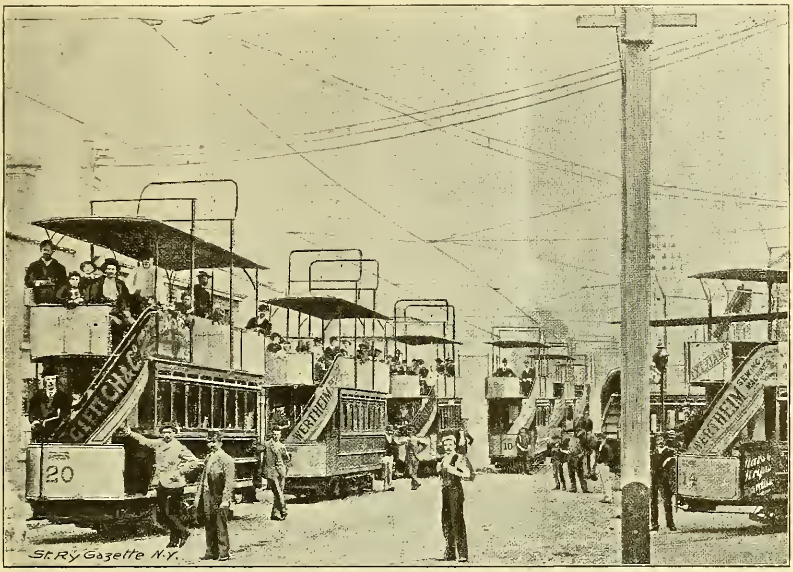
President Sullivan, of the Electric Traction Company of Philadelphia, received a $100 contribution from an unexpected source a few days ago. The contributor must have been employed by the Frankford & Southwark road more than 10 years ago, for in the letter which accompanied the $100 bill the writer refers to working 18 hours a day. The 12 hour a day law has been in effect nearly 10 years. The money was turned into the treasury of the Frankford & Southwark Company, as it was stolen before the company was leased by the Electric Traction Company. The letter referred to was as follows:

"DEAR SIR—Some years ago I conducted on the Fifth and Sixth road, and, as the company didn't pay me enough for 18 hours' work, I helped myself to what was enough to keep body and soul together; but, as I agreed to work for the pittance the company allowed, my conscience says I did wrong to take anything more. Consequently, inclosed please find $100, which I think will square things between us. JUSTICIA."

HOBART ELECTRIC RAILWAY.

The electric tramway system of Hobart, Tasmania has been in operation since 1892. The entire equipment was furnished by Siemens Brothers & Co., of London.

The track is laid with hardwood sleepers about 3 feet apart, to which are spiked down the rails of Vignoles section, weighing 40 pounds to the yard. The gauge is 3 feet 6 inches. Besides the two running rails, there are two continuous guard rails of the same section, but with the inside flange cut off, so as to lie close up to the running rail, forming a groove 1⅛ inches wide for the wheel flange. The surface between the rails and for a little distance outside is laid with asphalt. The rails are joined by means of ordinary fish-plates and bolts; but one running rail in addition is bonded at each joint by riveting to each end of the rails a corrugated copper strap 10 inches long by 1 inch wide. This is done to reduce the electrical resistance, as the rails are used for the return circuit.



DOUBLE-DECKED CARS OPERATED ON THE HOBART ELECTRIC RAILWAY.

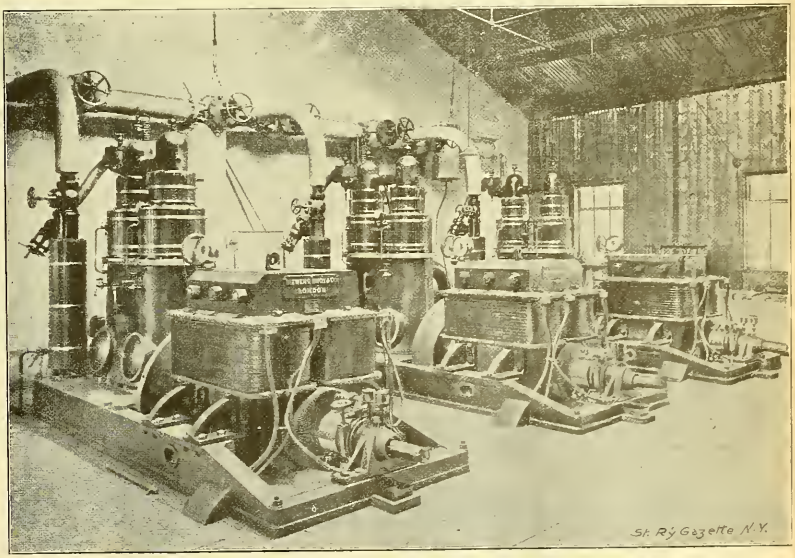
Side pole construction is used throughout the line. The poles are iron and are set 40 feet apart. On one side of the road they are straight, but on the other they are bent to avoid interference with the telephone circuit. The poles carry the feeder cables as well as the steel span wires.

There are now operated 20 double deck cars, each of which has a capacity of 24 seated passengers inside and the same number outside. The car with its truck and motors weighs six tons. Each car is equipped with two Siemens single reduction motors of a capacity of 12½ H. P. each. The motor speed is 400 revolutions per minute.

The connection between trolley wire and motor is effected by the wide collecting frame which is characteristic of the Siemens overhead system.

The power-house is an iron building 100 feet in length by 50 feet wide. The boiler house contains four Marshall multi-tubular boilers of 60 H. P., ranged side by side. The pressure is 160 pounds per square inch. The smoke is carried by underground flues to the base of the chimney, which is a wrought iron cylinder 90 feet high by 5 feet in diameter, standing on a foundation of 13 feet solid masonry, on piles driven 15 feet down to the rock. The boilers are fed by two Worthington pumps, taking their supply from a tank capable of holding 4,000 gallons, placed above the coal bunkers. The feed-water is heated by passing through two water heaters with vertical brass tubes, where its temperature is raised to 150 degrees Fahrenheit before it enters the boilers.

The engines, which are of the Willans type, are coupled direct to Siemens generators, each of a capacity of 250 amperes at a pressure of 500 volts when running at a speed of 350 revolutions per minute. The foundations are very solid, consisting for each couple of a block of concrete, 15 cubic yards, resting on piles. The steam is supplied to the engines through a ring-main, so that any one can be isolated The exhaust passes through a 12 inch main to the feed-water heaters. In normal working only two dynamos are used, he third being held in reserve: and it is found that two boilers can supply the necessary steam.



POWER HOUSE OF THE HOBART ELECTRIC RAILWAY.

The illustrations presented herewith are reproduced from the *Railway World* of London.

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Philadelphia, Pa.—It is said that the new street railway union will endeavor to have the working day reduced from 12¼ to 10 hours, and to have the present system of 25 cents a trip abolished, and the men receive $2 a day.

ANNUAL REPORTS OF CHICAGO STREET RAILWAYS.

At the annual meeting of the North Chicago Street Railroad Company, President Charles T. Yerkes read the following address to the stockholders:

According to my custom I herewith present to you my report of the business of our company for the last year, and while it does not tell of the immense earnings we were making in 1893, yet it is most satisfactory considering the extremely dull business which is prevalent everywhere in this country, and certainly promises well for the future. To sum up, the earnings of our road over and above operating expenses and fixed charges amount to $752,644.02, which is 13.634 per cent. on our capital stock, so that after paying our dividend we still have a credit to our surplus account of $92,731.02, making our total surplus at the present time $1,357,075.58. It is useless to make comparisons of the year 1894 with 1893, for the reason that the latter was an extraordinary year. The result, however, of the present year speaks for itself, and we start from that time forward with our natural comparisons. This large surplus is the property of the stockholders, and the question with the management arises: How should it be treated?

A year ago it was expected that this amount in some way would be divided. Later on, however, the necessity for changing the horse-car lines into electric roads, putting up power-stations and in other ways increasing and improving our property suggested themselves, and it was decided rather than borrow any money to use the fund for that purpose. It does not materially change our situation, for the money is merely taken from the surplus account, and there will be a time when it will be proper to make a dividend of this surplus in some shape or form.

The change of our motive power from horse to electric is one of the most important matters that has ever happened to your company, for the reason that, taking the experience of other cities, it is shown that electrifying the horse-car lines not only greatly increases the travel but decreases the expenditures. The small experience we have already had on our lines in the northwest part of the city shows us that this is a fact; so that the future seems to me to be full of promise from this source alone. I find that we are able to run our property at a cost of 54.33 per cent. of the gross receipts; that the cost of running the horse cars was 18.99 cents a mile a car, and the cost of running the cable cars was 13.02 cents a mile a car. The cost of the electric cars is not given, for the reason that the lines only opened about a month prior to the end of the year.

"The fact was demonstrated that the north side has grown most rapidly during the last three years and is still continuing to increase in population at a rate which exceeds that in any other part of the city. With this before us and a disposition to operate our road to the satisfaction of the public and for the benefit of stockholders, there is no reason why this year should not be an exceedingly prosperous one."

In reply to a question regarding the progress of electrical construction, Mr. Yerkes said:

I do not think our power-house will be finished before the middle of June. I think very likely by July 1 that three-fourths of the lines which are now run by horses will be run by electricity. We have poles erected on every street, with the exception of State street, and wires are strung on some of these streets. Some of the roads require new tracks. All the track that we have been laying in the last four years has been laid with heavy rail, with the expectation of some day getting more heavy motor power, and it has now come. Otherwise most of our track is already laid. We have purchased 4,000 tons of rails in anticipation of the laying of these tracks in the spring.

The following statement was presented by the treasurer:

RECEIPTS.

Passengers	$2,479,813.40
Other sources	85,805.00
Total	$2,565,618.40

EXPENSES.

Operating expenses	$1,317,326.04
Railway rental	263,355.07
Interest, insurance, taxes	187,293.27
Horse depreciation	10,000.00
Construction	5,000.00
Total	$1,812,974.38
Net earnings (13,684 per cent.)	$752,644 02
Dividends paid out (12 per cent.)	659,913.00
Credit to surplus account	92,731.02
Balance to surplus Jan. 1, 1894	1,264,444.56
Balance to surplus Jan. 1, 1895	1,357,075.58

ITEMS.

Total number of passengers	49,571,463
Miles traveled	8,793,587
Average daily receipts	$6,794.01
Average daily operating expenses	$3,691 30
Average daily trips	3,861
Average daily miles	24,091

WEST CHICAGO STREET RAILROAD.

At the annual meeting of the West Chicago Street Railroad Company President Yerkes presented this address :

We have just passed through a year much in contrast with the preceding one, and while the results are not what we should like, yet we can congratulate ourselves that our business is fully up to that of most other kinds. The fact that the population of the West Side is now mostly made up of labor classes has aided much in making poor traffic for the year 1894. The stopping of foundries, manufacturing establishments and of work generally has taken a great deal from our receipts, and as they had to compare with a year of great prosperity the comparison was not encouraging. However we have earned a fair dividend on our stock, and while we have reduced our surplus fund somewhat we have still a very large amount remaining—much more than is the habit of corporations to possess. To sum up, the net earnings for the year amount to $803,139.62, which is 6.09 per cent. on the capital stock of our company, and which makes a reduction in our surplus fund of $381,159.13, leaving the surplus at the present time $1,481,681.20. Considering the fact that this fund was accumulated really for the purpose for which it has been used we do not feel that it is a special disadvantage to the company to lessen it. The object of the management in accumulating the surplus is, first, to provide for loss by fire ; second, against strikes ; third, any poor season of business such as we have just gone through.

The fore part of last year was very discouraging. During the summer, however, a great deal of money was made, and we find the last two months, November and December, far in excess of last year, showing that business is improving decidedly. While the receipts for the year were less, the expenses were decreased also, but, of course, not in the same ratio as the receipts. If precedents are of any use I can say that the earnings of the road for November and December were $70,000 in excess of the same months last year.

Since our last meeting ordinances have been passed giving this company the right to build a number of new lines, and also to change any of the old lines now running by horse to electricity. This your management feels will be of great service, not only to the public, but to the company itself, for the reason that better service means more travel, and the electric roads can be operated with less expense than the horse roads.

Considering the fact that the receipts of the horse cars were almost equal to the cable cars it demonstrates how important an event it is in the history of our road to make this change. The small experience which we have had already shows us that the lines which we have changed to electric power have been much benefited; the people are better satisfied, and are induced to ride more on the cars. This, combined with the decreased expense in operating, certainly makes it more to our advantage to go on with these improvements as rapidly as possible.

I would here state that at our meeting last year I suggested that the surplus fund was of such an amount that a nine per cent. dividend could be continued during the year, no matter what our earnings might be, and this programme has been carried out. Whether it is wise to still further encroach upon this surplus is a matter for future consideration. The amount of traffic which can be taken from our road by elevated railroads has been thoroughly demonstrated, and the management does not feel that that business cuts much of a figure in our receipts. We shall hold our patronage, as New York examples and others in our midst attest. It is indeed impossible for elevated roads to successfully compete with the surface lines. However, the future will determine this, and, as I said before, there is nothing in that situation that causes any fear.

In regard to the amount of business done on your road during the past 12 months, I submit the following:

Number of miles run	15,671,500
Number of passengers carried	85,287,302
Receipts from horse cars	$1,926,026
Receipts from cable cars	$2,216,427

You will notice that the expenses of the horse cars in order to produce $1,926,026 have been $1,525,898, while the expense of the cable cars to produce $2,216,427 has been $992,728. Therefore, the horse cars are changed to electricity, and the electric lines can be operated even as cheaply as the cable. You can see the result which this would produce. The future is full of promise of improvement, and before our next meeting we will certainly have our lines in such condition that our earnings will be very greatly increased.

SECRETARY-TREASURER'S REPORT.

George J. Yuille, secretary and treasurer of the company, made the following report ;

Gross Receipts—	
Passengers	$4,112,453 00
Miscellaneous	1,225.00
Advertising	23,184.00
Rents	14,373.00
Total	$4,181,237.14
Operating Expenses—	
Transportation	$1,252 835
Maintenance of way	139,286
Motive power	756,768
Maintenance of cars	106,446
General expenses, including damages	263,289
Total	$2,518 626
Difference, being the gross earnings	$1,662,610
Rent of leased roads	490,510
Coupon interest	240,862
Interest and taxes	128,168
Total	$859,470
Leaving a balance applicable to dividends	$803,139
Dividends paid	1,184,298
Deficit taken from surplus	389,159
Items—	
Trips made	1,912,420
Miles run	15,671,500
Passengers carried	85,287,302
Receipts per mile (horse cars)	.2320
Receipts per mile (cable)	.3007
Expense per mile (horse cars)	.1838
Expense per mile (cable)	.1346
Passengers carried on horse cars	40,106,059
Passengers carried on cable	45,181,243
Average number of miles per horse car per day	12.19

MR. YERKES, replying to questions, said he could tell better in the first quarter of 1896 as to what the dividend this current year would be. It would depend largely on the business done. The power-house will be completed May 15, and the starting of the electric line depended on that. One hundred miles of track would soon have electric cars. Out of the 150 miles only about one-third was cable. There was no intention on the part of the management to issue any more stock at the present time. Therefore, it was an open question whether it was well to encroach any more on the reserve fund. There might be no necessity for it; possibly nine per cent. would be earned this year. It was not worth while for him to guess for them; they could do that as well as he. Probably $1,000,000 of the surplus would be borrowed for construction work; at the same time that would not be charged against the surplus fund; so that if business continued as he hoped it would, there was no reason why the surplus fund should not be sometime divided among the stockholders. It would not be a fair thing to charge the construction permanently against the surplus fund, because the money had been earned and belonged to the stockholders, and they ought to get it some time. As to the tunnel company, the railroad company paid the interest on its bonds in return for using it.

CHICAGO CITY RAILWAY COMPANY.

The annual meeting of the City Railway Company was held Jan. 15. Of the 90,000 shares of stock 71,903 were represented, and these were all cast in favor of the re-election of the entire board of directors. The usual resolution indorsing all the acts of the directors during the last year was passed.

Secretary Greene's report for the year made the following showing :

Passenger earnings	$1,239,749.33
Miscellaneous receipts	21,869.12
Total earnings	$1,261,618.45
Cost of operating, including insurance and taxes	2,838,684.38
Interest on bonds	207,877.50
Total	$3,046,561.88
Net earnings (13.53 per cent. on capital)	1,218,056.57
Dividends paid (12 per cent)	1,080,000.00
Balance to surplus account (1.53 per cent.)	$138,056.57
Number of passengers carried—	
Cable lines	54,690,808
Horse lines	20,589,363
Electric lines	9,514,816
Total	84,794,987
Decrease from 1892	3,223,874
Receipts from passenger traffic per day	$11,615.75
Decrease per day from 1892	403.68
Expenses per day	7,777.22
Increase over 1892	101.18
Number of car-miles run—	
Cable lines	15,231,400
Horse lines	3,965,750
Electric lines	1,850,260
Total	21,015,410
Increase over 1892	226,700
Cost of operating per mile—	Cents.
Cable lines	9.97
Horse lines	25.39
Electric lines	16.90
All lines	13.49

President Wheeler, in his report, stated in reference to electric lines that July 16, 1894, ordinances were passed authorizing change from horse power to electricity on lines aggregating, single track, 82.04 miles, of which there was in operation in 1894 19.32 miles. There was ready for operation in January, 1895, or on the erection of addtional generators, 27.97 miles, leaving to be completed later 34.75 miles. Horses were reduced 662 during the year, leaving 1,604 on hand December 31st last. It is expected that 710 will be sufficient for operating by May 1 next. Mr. Wheeler stated further that the greater portion of the cable track will require new rails, which have been ordered and will be laid this year. A large amount of repair work was made necessary in 1894, including the practical reconstruction of the Sixty-first street viaduct.

CHICAGO GENERAL STREET RAILWAY.

At the annual meeting of the Chicago General Street Railway Company, which operates the West Twenty-second street line, it was reported that during the last eight months the company had carried 887,402 passengers. The gross receipts during that period were $45,546; the disbursements $27,866; surplus $8,930. The road now has 16 miles of track in operation and occupies 10 miles of street. The cost of operating road was 14.41 cents per car mile. The company has 25 new cars, which are being placed in operation on the road. President Bonney said in his report :

This company was the first to operate a trolley car within the West Division of Chicago; it is the first to operate a storage battery car within the city limits of Chicago; it is the first of the Chicago companies to adopt a vestibule cab for the protection of the motormen, conductors and smokers; it it is the first of the Chicago companies to adopt the electric brake, and it will be the first to put a train in service in which the movement of every car is controlled by the motorman in the front cab.

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SALE OF THE LAKE ROLAND ROAD, BALTIMORE.

The Lake Roland Elevated Railway, at Baltimore, has been purchased by the City & Suburban Railway Company, and the two systems will hereafter be operated as one. Rumors have been in circulation for weeks regarding the probable sale of the Lake Roland property. It was at one time rumored that the Traction Company of Baltimore had about secured the road. This report proved erroneous, though it was doubtless true that some of the officers of the Baltimore Traction were considering the Lake Roland railway as a desirable purchase.

Mr. Nelson Perin, the president of the City & Suburban Railway Company, makes the following statement in regard to the purchase: "The purchase of the Lake Roland Company by our company will perfect our present railway system and will enable us to do away with unnecessary competitive mileage at a saving of a sum considerably in excess of the entire interest on the cost of the road, including the interest on the entire issue of bonds by the Lake Roland Company. For instance, on North avenue, between North street and Madison avenue, both companies have been operating a full service of cars at practically the same intervals, while there is only a profitable business for one company. Hereafter this waste of mileage will be saved by dispensing with one set of cars. A similar saving will be effected where the two systems are in direct competition between North avenue and Hampden. In addition to this, the improved transfer facilities, which can be put in operation now that the two roads will be under one management, will be certain to add largely to the receipts of the combination, while there will, of course, be a large saving effected in operating expenses.

"The elevated structure of the Lake Roland Company will be a great addition to the City & Suburban system. It will enable us to run all of our long-distance cars direct to the City Hall at a great saving of time, and will offer transfer facilities to our York road cars at Fayette and North streets, which they do not now have."

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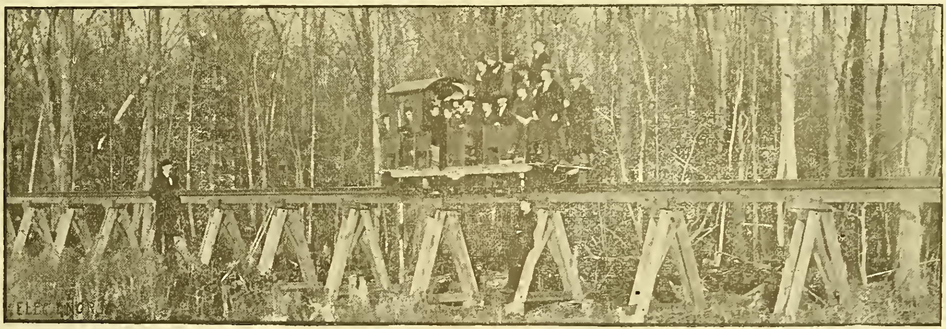
THE BEECHER SINGLE RAILWAY SYSTEM AT WATERPORT, N. Y.*

For some time past experiments have been carried on at Waterport, N. Y., with a system of railroad construction requiring but a single rail, the invention of Capt. Lina Beecher, whose work in this and allied electrical branches dates back over ten years.



BEECHER SINGLE-TRACK SYSTEM.

The Beecher system of road construction consists of a track having a single T–rail with two guide rails 18 inches apart running horizontally beneath it. The car is provided with two wheels in the centre, bearing on the T-rail, with four guide wheels depending from the car frame running horizontally with bevel edges upon the guide rails; the use of these guide rails and wheels is to keep the car in an upright position when stationary or running at a slow rate of speed and to prevent the possibility of its leaving the track. This is further accomplished by the under-flanges on the guide wheels. When the car is running at a speed of over 10 miles an hour the car runs on the two center wheels, only touching the guide rails occasionally with a swinging motion.

The equipment of the experimental car which has been operating at Waterport consists of 50 cells of Chloride accumulators and a 5 h. p. slow-speed, series-wound motor, together with controlling apparatus. The car complete weighs about four tons without passengers, and has a seating capacity for 24 persons. On a recent trial trip carrying a load of 23 people a speed of 19 miles an hour, it was reported, was attained with an expenditure of only 3¾ h. p. The electrical equipment was designed and installed by M. H. Johnson, of Utica, N. Y.

After a test in the recent blizzard, during which the car operated perfectly on a track covered with snow and ice, a contract was given by the Waterport Electric Light & Power & Railroad Company for the construction and equipment of four miles of this road extending from Waterport to Lakeside in Orleans County, N. Y. Should this piece of track meet with the success anticipated, the line will be extended northeast to Oak Orchard-on-the-Lake, and south through the important towns in the vicinity, through to Batavia, in Genesee County, in all a distance of about 40 miles. The Equipment Construction Company of Batavia has received the contract for this work and will equip the line with cars to make a speed of about 40 miles an hour including stops. Each motor will draw a train of two trailer cars.

The accompanying engraving shows the experimental car with a piece of the track built on trestle across a swamp. The ordinary structure will be upon single posts and will normally be 12½ feet above the surface, crossings at highways to be 15 feet and at railroads 18 feet high.

The road will be operated by water power from Oak Orchard River at Waterport, where a dam 40 feet high will be erected for that purpose.

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LAKE STREET ELEVATED REPORT.

The annual report of President D. H. Lauderback, of the Lake Street Elevated Railroad Company, Chicago, was a remarkable document. The main part of the report was a criticism of the previous management and a comment on its peculiar methods of financiering. An abstract of the report follows:

The present management of this company came into office July 2, 1894, about four months after the road was delivered to the company by the contractors, and eight months after trains were first run for the accommodation of the public. We found a structure comprising two tracks throughout and three tracks in part, covering a distance of six miles and 2,059 feet, along Market and West Lake street, and equal to 14 miles and 1,301 feet of single track, with reasonable equipment and fitted with stations and office building. At a liberal estimate the 6⅗ miles should not have cost over $2,017,000 To this should be added $500,000 for right of way, reorganization, miscellaneous expenditures $2,000,000, rolling stock and equipment $600,000. The total estimated cost is $3,317,000; for this we found the company had issued:

Its 5 per cent. bonds	$6,500,000	
Of which there was in the treasury	257,000	
		$6,243,000
Due the contractors for extras		350,000
Issued in capital stock		10,000,000
Total		$16,503,000

Besides the amount of bonded indebtedness before mentioned we found a floating debt, July 2, 1894, that was not on the general books of the company, amounting to $1,067,697.

To earn even the interest on the bonds issued at the date referred to (July 2, 1894) required a total average of 50,000 passengers a day on the basis of 60 per cent. for operating expenses, while the actual average number carried since March, 1894, to this date has been 27,135, or a little more than half the required number.

Upon this showing it is apparent that the road has been used to issue securities to the investing public regardless of the equivalent or its probable earning capacity. This enormous issue of securities was made possible by the construction contract, entered into through an arrangement, we are informed, with parties controlling the company's affairs, whereby they were to sell to the contractors their holdings of the company's securities at a rate much above the market, to be taken and paid for after the contract was let and as a consideration therefor. In addition to this it is alleged that in the course of subsequent transactions affecting the interests of the company during the construction of the road the officers, agents, and representatives of the company were in the pay of the contractors and were practically their employes; further, that some of them received large amounts of stocks and bonds from the contractors in addition to their salaries.

The treasury bonds have been used as collateral for the floating debt, and $603,000 in bonds have been borrowed from various parties by the company and used for the same purpose. On the above accounts included in the floating debt there have been issued by the trustees since July 2, 1894, additional bonds amounting to $871,000, and the proceeds thereof have been used in settling obligations on Humboldt Park extension and in reducing the floating debt to its present figure; namely, $651,032. There have also been issued, on account of the extension to Wabash avenue, bonds in the sum of $48,000, thus making the total issue at this time, including the bonds in the treasure $7,419,000.

There will be a further issue on account of the Wabash avenue extension of $154,000,000, and as there was no money on hand to pay the interest due Jan. 1, 1895, bonds will be issued on that account for the deficiency in the earnings, $101,000, making the total bond issue required to date $7.674,000.

We found also that a right of way had been purchased for the so-called Humboldt Park line, commencing at West Lake street, between Artesian and Western avenues, running northerly to Milwaukee avenue and northwesterly on the north side of Milwaukee avenue to the city limits, which is, in our judgment, the poorest territory that could have been selected.

To complete the purchase of the balance of the right of way to Milwaukee avenue would require about $150,000; and to build the structure, 2.96 miles, would cost an additional sum of $668,960. Total payments and liabilities already incurred are $434,152.

While this proposed branch of the road might be made to pay its operating expenses as far as Milwaukee avenue, we doubt whether it could earn anything on the money invested. The real estate, being under the lien of the mortgage in case the road is not built, can be released by the trustees and sold to the best advantage.

We found, also, that there was due the company from the contractors one mile of road, for which the company had agreed to accept an equivalent in the down-town terminal. As all the bonds provided for in the contract for this mile had been withdrawn from the trustee, we arranged that there should be an equivalent deposited by the contractors with the trustee: namely: Cash, $198,000; and bonds, $25,000. Of this amount there has been withdrawn from the trustee, on account of the Wabash avenue extension, $90,000.

We also required the contractors to credit this company with $65,746 on account of defective foundations and disputed liabilities.

Since the present management took charge of your road the company has secured the franchise for Lake street from Market to Wabash avenue, giving it an entrance into the heart of the business district, which, while it will increase its earnings materially, cannot, however, be expected to earn the present enormous deficit in interest charges. The extension is now under construction and will probably be completed by April 1, 1895. The foundations are all in and part of the superstructure has been shipped from the mills.

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* *Electrical Engineer*, New York.

From the Treasurer's statement it will be seen that our interest charges for the ten months ending Dec. 31, 1894, amount to $284,730, and our net receipts, for the same period, $138,004, leaving a deficit of $146,725. To meet our interest payments on the bonds now outstanding on the basis of 60 per cent. operating expenses will require an increase of 90 per cent. in the average number of passengers carried, which is impossible in our present territory.

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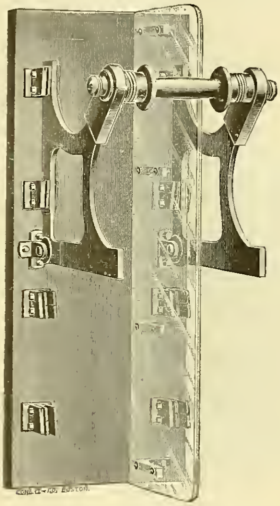
A NEW HIGH-POTENTIAL SWITCH.

The high-potential knife switch illustrated herewith was designed by Charles H. Herrick, E. E., and is manufactured by the W. S. Hill Electric Company, Boston, Mass. The switch shown in the engraving is one of a group of six switches which are now in use in the station of the Narragansett Electric Lighting Company, of Providence, R. I., and which are successfully carrying currents of 400 amperes at 1,000 volts alternating current.

It will be seen that the switch has very quick break; it has a flash guard between its opposite poles, breaks both machines and circuit, and has its yoke at a point of absolute safety both to operator and switch. In operation, there is no flash when the switch is thrown, and only the slightest possible "wink" in the lamp to which it supplies current.



High Potential Switch.

The illustration shows a switch adapted for use on the front of switchboards, but designs have been completed for the same type of switch to be placed on the rear of the board. This type is operated by a lever, a handle extending through a slot cut in the switchboard. The switch has solid cast copper blades, micanite insulations on the yoke and the Hill reinforced contacts. It will be given a carrying capacity of 50 per cent. in excess of its regular duty to allow for all reasonable overloads. It is adapted for all varieties of duty from 110 and 500-volt circuits to those carrying 2,000 volts.

It is the intention of the Hill company to build these switches in all sizes and types, as demand may arise for them, and will design this switch to perform any special duty.

The illustration shows the switch in use on the alternating switchboard designed by Mr. Herrick for the Narragansett Electric Lighting Company, which is capable of handling 50,000 to 100,000 16 c. p. lamps. The design of this board is such that all changes of machines and circuits are made instantly and without the use of plugs or cables of any sort. The generators can be arranged to run in multiple or independently, as desired, provision being made in the design of the board to admit of this feature. This board was also the product of the Hill company's shops, and is strikingly handsome, being 22 × 6 feet in size and the material Italian marble.

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THE STREET RAILWAY STRIKE IN BROOKLYN.

(*Continued from Page 24.*)

tables and put in the trips where the public want them."

Mr. Lewis said that the company would agree to retain the two-thirds and one-third table, or 66 straight runs to 33 trippers, and then arrange for extra trippers as might be found necessary.

Mr. Connolly—Are we to understand that you want to put on more trippers?

Mr. Lewis—Yes.

Mr. Connolly—Well, we might as well stop at once right here. The men will never agree to it.

Mr. Lewis—I want our position to be distinctly understood. The employees will remain just as they are at present. The straight men will continue to get $2 and the trippers $1.50, and all we are going to do is to add to the extras. If the men decline these terms and tie us up we may not be able to do that. We can't be tied up and pay for it. If we are tied up somebody will have to foot the loss. We are going to run this road for the public, for the interests of the stockholders, and, as far as possible, for the interests of the men. We do not propose to have our business taken out of our hands.

Mr. Connolly—We can't agree to your proposition for the extras. It would simply bring more starving men around the depots.

Mr. Best—It would be more humane, Mr. Lewis, for you to kill the men than to starve them to death.

Mr. Lewis—I think the Executive Board is taking a greater responsibility than it should do if it ties up the road. I could dictate a letter which would go to the men, embodying clearly the views of the company, and they should have an opportunity to consider it. If the men say then they will not accept our terms they will be making a great mistake. We are going to stand even if the men put the road into bankruptcy. If we were to follow out your suggestions we wouldn't have the money to pay the men. These times are more depressed than any in the history of the country, and the lawmakers are largely responsible for this. Something is wrong here, and something is wrong all over the world. If you tie us up, and we come out with a loss of $500,000, we must reduce the expenses.

Each side in the controversy has learned by experience of the value of public opinion. To concilitate the public each of the contending interests was ready as soon as the tie-up had gone into effect with a statement explanatory of its position. President Lewis, of the Brooklyn Heights Company, made this explanation on behalf of the companies:

The tie-up of this day is without any just cause. A demand has been made for increased pay for nearly all grades of employees, and for such rearrangements of the manner in which labor is to be performed that, if conceded, would be greater than the company is able to bear.

The committee of District Assembly No. 75, who represented the men for some years in the past, met the officers of the company on Saturday afternoon last and discussed the proposition which the company was prepared to make to the men, and while it was objected to by the committee and stated by them that the men would not accept it, the company had grave doubts.

I stated to the committee before they left the office that, if they tied this road up before I could get an opportunity to get a circular in the hands of our employes. I would hold the committee responsible, and believed the public would also.

The letter to the men was prepared by Sunday noon and an effort was made to get it printed prior to the men laying up for the day, but, it being Sunday, we were unable to do so.

I feel that the action taken by the committee in ordering this tie-up without first giving the opportunity to the company to get such information to its men as would tend to defer and possibly avoid a tie-up at all is without justification.

The company appreciates the serious inconvenience which this tie-up will cause to the people of the city of Brooklyn.

The company will make every effort for the best in the emergency and assures its patrons that every exertion will be made to run the cars.

The men promulgated the following statement:

The Brooklyn Heights Railroad Company having endeavored to force men employed in the electrical department to take the places of the motormen to-morrow morning, and on their refusal having summarily laid them off, have thus forced an issue with the men.

It has been clearly demonstrated that the companies are acting in consort.

We realize that the public will necessarily suffer some inconvenience for the time being, but we hope that they will be patient with our people and not complain, nor condemn us without fully understanding the situation.

Since the introduction of electricity as a motive power trips have been added to the days' work on nearly all the roads without any additional pay.

The strain, mentally and physically, on the men has been increased doubly, and the companies refuse absolutely to shorten the hours or increase the pay.

The men are unable to work as many days as formerly, being compelled to lay off more frequently for rest, and their wages are correspondingly decreased. Besides this, many abuses have crept into the workings of the various lines.

The ten-hour law of this State provides that no day's work on a surface street railroad shall exceed ten hours, to be performed within twelve consecutive hours. Mr. Lewis, Mr. Norton and Mr. Wicks absolutely refuse to recognize this legally established work day or to pay for it.

They all insist that the men shall give some of their time for absolutely nothing.

They all insist that they shall be permitted to run trippers at will and pay for them at trip rates. on the shallow pretext of accommodating the public.

At the present time the minimum price for any car run is fixed at $1.50, which we believe is little enough on which to support a family, even if the opportunity to earn it is offered every day.

By the proposition made by the companies the men might be allowed to earn from 40 to 80 cents a day, which would be a case of slow starvation or sure death on the installment plan.

The men know too well what such a plan means, for many of them suffered from a similar abuse some years ago.

While such a plan would be an apparent benefit by making an increased pay roll, still the maximum wages which the extras could earn would be reduced under it almost 50 per cent., and yet the officials have the effrontery to tell us that this plan would be a benefit. Being practical men in the business we know it would not.

The companies are prohibited by law from running their cars at a rate of speed exceeding 10 miles an hour within the city limits. There is not a single company in Brooklyn which has complied with this law or made any attempt to do so.

The companies all have schedules posted at their depots which compel the motorwen to run cars at a rate of speed averaging from 15 to 20 miles an hour, in order to make the time as per schedule. Failure to make the schedule has been punished with suspension from work and sometimes discharge.

Nearly 100 fatal accidents have occurred in this city since the advent of the trolley, while hundreds have been maimed for life. These fatalities and maimings have been due almost entirely to selfishness of the companies.

The railroad officials lay the blame on the motormen, and have the gall to suggest that the poor motormen be punished, when these officials know full well that they themselves are to blame because of the speed at which they compel the motormen to operate the cars.

When accidents occur the motormen are almost invariably discharged or otherwise punished. We desire that the schedules shall be so arranged that the men can run the cars with safety to the public and to themselves, but the companies say "No!" and are even now scheming to crowd on more trips on the various roads, thereby increasing the speed still.

Our people do not desire to be called reckless or murderers, but want the blame placed where it properly belongs—on the men who compel them to run at a reckless rate or lose their jobs.

On these grounds we ask the indulgence and the sympathy of the public to assist us in freeing ourselves from the numerous abuses heaped upon us by the corporations.

The strike opened quietly on Monday morning. The companies decided to make no great effort to move their cars, but to make plans for a somewhat complete resumption of service later in the week. The Brooklyn Heights Company ran cars over a single line, and encountered no great amount of opposition. Traffic was suspended at 6 o'clock in the evening. The cars carrying the United States mails were not disturbed by the strikers.

The elevated roads did a tremendous business, though the lines are so laid out that they do not reach many sections in Brooklyn, and persons were forced to walk long distances to reach stations. The elevated roads had all their rolling stock in service, and trains were run on shorter headway than usual.

On the second day of the strike the Brooklyn Heights Company started a second trolley line, and expressed belief in its ability to break the strike, provided it was furnished adequate police protection. During the day the strikers interfered with the operation of a number of cars and many acts of violence were reported. None of the outbreaks was serious, however, although 14 persons were arrested for acts of violence in interfering with cars. It was decided to postpone until the following day anything like a general movement to operate cars. No trouble about securing new employes was experienced; it was soon apparent that the companies could, without great trouble, secure all the motormen and conductors necessary to man the cars.

On Thursday the Brooklyn City & Newtown Company reached a compromise with its employes and its lines were put into operation. At this time (Friday) no agreement has yet been reached by the other companies and 40 lines are still tied up.

APEX FENDER.

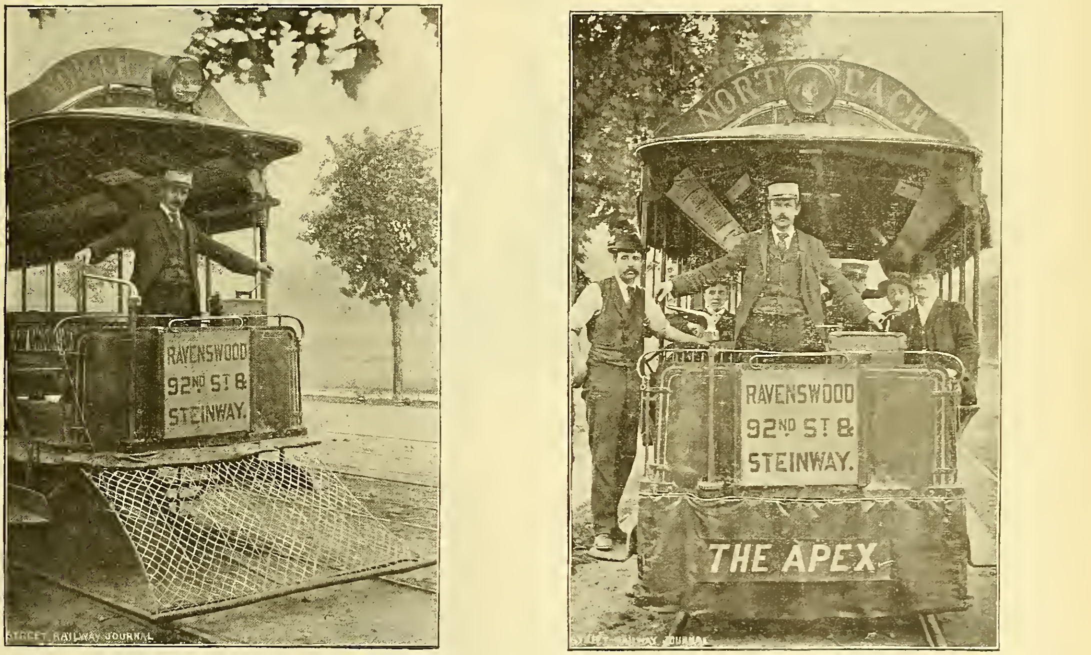
The accompanying illustrations show the Apex street railway fender. The fender proper is made of rope netting and bound at the bottom by steel wire, covered by rubber tubing 1½ inches in diameter. When in position ready for use, Fig. 1, the bottom of the fender is almost directly on the ground, and it extends 3 feet 9 inches from the dashboard. The methods of suspending the fender is such that plenty of allowance is made for the seesawing of the car, so that in no case can the bottom of the fender strike stones in the street.

When it is not in use the belting is drawn back to the dashboard of the car so that it is scarcely noticeable. It is brought into use almost instantly by the motorman pressing down a lever similar to that used for ringing the gong. The mechanism employed for this purpose is very simple. To the one-inch iron pipe at the bottom of the fender at the rear is an inch iron pipe to which at the center is attached an inch-and-a-quarter pipe which slides into a two-inch pipe. In doing so it compresses a spring. When the spring is released it shoves the fender forward and downward into its working position.

There are no screws to loosen preparatory to putting the fender into its normal position. The pressure of the hand is sufficient to force it back out of the way. The weight of the fender is about 100 lbs.

The feeder has been tried in Albany, and on the Steinway road, and it is said it has picked up prostrate bodies on the track. It was invented by David O'Neill, and is put on the market by the Apex Trolley Safety Net Company, New York.

In Fig. 2 the fender is out of service, with the netting covered with an apron. It has been found, however, that the apron is unnecessary, and as it collects mud it has been discarded as a part of the equipment. The netting occupies the same space as that which is occupied by the fender as shown in the illustration.



FIGS. 1 AND 2.—APEX FENDER.

THE PRESENT POSITION AND PROSPECTS OF ELECTRIC TRACTION IN ENGLAND.*

BY M. HOLROYD SMITH.

So much has been published in the technical press from time to time on the question of electric traction that there hardly seems any excuse for writing more. What good can be accomplished by adding to a subject that has been dealt with by numerous and various writers, some who have devoted much time, thought, energy, and enterprise to the subject, some who, having read a little, thought a little, made many calculations on assumed data, and not being troubled with such commonplace matter as solid facts and experience, have allowed their untrammeled pens to write line upon line. To be candid, there is very little left to say that is new and interesting to the initiated, but to the world beyond there is still very much. The first principles of electric traction are very imperfectly understood or realized by the lay mind, and perhaps only partially grasped by many who would not like to be so classed, or else why do the same things keep appearing again and again, the notions that have been thought out, experimented with, and abandoned, are brought forward as new-born wonders to revolutionize science and practice.

The object of this article is for general more than technical considerations, and even then little can be advanced that has not been said, and better said before, the only room for diversity being the relative importance given to various causes.

Over a million and a quarter is invested in the United Kingdom on enterprises dependent for their success on electric traction, a fact hardly realised by those who grumble at the lack of progress. By that statement let it not be supposed that £1,250,000 is expended in electric plant only; for example, in the City & South London Railway and the Liverpool Overhead, the electric plant is comparatively a small portion, but a most important part, for upon it the success of the whole depends. Will any one venture to say that traction on either of the lines quoted could have been as well done by any other known means?

Although it is from a national point of view satisfactory to have actual proof of the skill and ability of English electrical engineers, proof that they have not to go elsewhere to learn how to execute any work intrusted to them, still, it is to be regretted that the national purse has not been more fully opened to enable more public benefit to be derived from the skill and resources available. What is the reason of this restraint? The question has been asked over and over again, and perhaps the best way to proceed is for the electrical world to ask themselves how far they are to blame for the delay. Electrical engineers are not immaculate, their human nature is pretty much the same as that of other men, and it cannot be matter of surprise that they should watch carefully their individual interest, but it must, to a reflective mind, be a matter of regret, that there has not been more concerted action among them. A little less time and money spent in the law courts, and more clubbling together for mutual advantage, might be more to the benefit of all concerned. The enterprise would not so often be stopped with the speech, "When doctors disagree," etc. Just an example: the owners of a tramway think it might be worth their while to change from horses, and ask for terms from some one experienced, not only in the technique but in the business side of the subject, which results in a statement showing that whereas it now costs the tramway company 10½d. per car-mile with horses, it will only cost 8½d. if worked electrically. This figure leaks out, and in rushes some brother electrician with a competitive scheme, declaring it can be done for 3d. No. 1 is put on one side, because the tramway company are given the impression that he is asking too much and wants to make too much profit. No. 2, who is given the option of proceeding, finds that to obtain the necessary capital he must pay much more to the financiers than he had any idea of. Nobody will lend him the money for five per cent. interest. He finds drivers and conductors, inspectors and checkers, engine men and car cleaners, all want higher wages and less hours than he expected; that some hard-fisted landowner won't let him have the land whereon to build except at a ruinous price; the town authorities want to rate him at the highest rate on every conceivable point; his directors expect some remuneration for their valuable services; the tram company actually want him to compensate them for the value of their horses and harness, which will be useless to them if they allow him to work electrically, and they will not promise him the line for more than 10 years, and he must, therefore, have such a rate per mile that will enable him to create a sinking fund that will pay off the capital in that time. It is slowly but surely borne home upon him that 3d. per car-mile won't pay for all this, and he begs to be excused, and secretly wonders how No. 1 dared to offer to undertake the work at 8½d. In the meantime the shareholders have lost the benefit of the 2d., which would have given them what they have never received before, viz., a dividend, for the tramway directors think they had better wait and see what further improvements will be made, as "electricity is only in its infancy." Oh, that a millstone were round the neck of the man who set that phrase going, and kept so many would-be users always waiting for improvements. Admit, if you like, that electricity is only in its infancy, but claim that the infant must have fresh air and exercise, or else it cannot grow, and don't suppose, because you see some other person's infant occasionally stumble and hurt itself, yours would come forth as a strong man and rejoice to run a race.

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* London *Electrical Review*.

Has not a lot of difficulty arisen from failing to realize the stress and the strain the little infant had to face and overcome? It will be found that success has only attended those who have risen above the decimal point and provided weft and sinew enough.

Perhaps the greatest internal cause (*i. e.*, arising from the electrical world) has been the constant flaunting before the eyes of the public the mystic battery. That box from Paris taken to Glasgow, containing a storage of energy enough to move mountains, still lives in the imagination of the public, and a plausible enthusiast can still persuade a body of otherwise clearheaded business men, that they must not have their horse lines converted into electric lines by any direct method overhead, underground, closed or open conduits, etc., because a battery—a new battery—is just coming out that will make all such expensive and dangerous (?) devices unnecessary. Oh, electricians, why grumble at the hesitation and delay of the public when you have yourselves to blame? The battery that can compete with direct driving does not yet exist, then why delay and hinder work because you hope for one? The only commendable use for batteries, advocated as long ago as 1888, has at last been put into practice on the Douglas & Laxey line. Surely in a technical paper it is not necessary to argue on the subject, but it is unfortunately necessary to beseech men not to allow their zeal to go beyond all claim to discretion. Who would venture to say that a battery or some equivalent will *not* be discovered? Who would put a limit upon what patience and research may some day evolve from the wonderful forces of nature, but such things as yet are not, and, therefore, who (able to examine and reason and not carried away by an enthusiasm that cannot be commended) can consistently delay true progress and present possibilities by dreams of what may be. Some day a submarine boat will start from from Liverpool and dive across to New York regardless of wind and wave, no storm hindering its swift progress, but those who have important business in America had better not wait till the *Nautilus* is built.

Now for the outside causes--circumstances over which electrical engineers *per se* have no control.

Most English towns where the traffic justifies the outlay already have tramways.

The roads in England are usually so good that ordinary vehicles can safely and easily be run upon them, whereas in America it may be said that as a rule the roads are so abominably bad that the only safe means of vehicular traffic is the tramway. The influence of this is much greater than the British public can fully realize.

England, an old country, is conservative to the backbone. Even those who profess a liberal creed in politics are conservative in all things else. How is it that our enterprising men must go elsewhere if they wish to earn for themselves a reward for their labors? Cable lines first suggested here were not tolerated until their innings had been played out in America, and then, forsooth, when they are rapidly being supplanted by electric lines in the States; then, and not till then, did borough engineers think fit to advise their corporations that they are fit and proper things to be adopted in English towns.

It is worthy of note that the Portrush, Bessbrook, and Blackpool lines, which may be taken as typical examples of electric traction, were all working successes before any electric street railways were commenced in the States, and yet it was not until the rapid advance and deserved popularity of electric traction there that English authorities and English financiers could be brought to seriously regard its introduction here. Truly we are a conservative nation.

As an ordinary and civilized people, we do not want that liberty which extends to license. We still wish to protect our property and person from the ruthless vandalism committed often by the "Bird of Freedom" when he soars, but there are customs more honored in the breach than in the observance, and there is some comfort in the assurance by the Board of Trade of a willingness to help instead of hinder the utilization of the results of science for the public benefit.

Another serious cause of delay, and one difficult to face and very tender ground to trespass upon, is the financial conditiion of the existing tramway companies. Very few of them can afford to make any serious addition to their plant. This is neither the time nor place to enter into a criticism of why they cannot—sufficient to lament the fact.

The recent decision of the House of Lords is regarded by many as a disturbing and retarding factor but surely if that decision be carefully examined by disinterested minds it must be regarded as a just one. Its result to those interested is certainly distressing, but the only comfort that can be offered them is the poorest comfort of all, viz., they have only themselves to blame. There is an old proverb which speaks about laying by for a rainy day, and many of those old-time proverbs contain truth which cannot be disregarded with safety.

Is it necessary to give any more reason for the delay? Unfortunately most of them still exist and must be faced.

Take the last first: The decision of the House of Lords though a dark cloud, has a silver, nay, rather a golden lining, for it will most probably result in the corporation and town councils acquiring the tramways, and when they come under the control of the representative of the ratepayers, the residents in one ward will object to be taxed for a tramway in another district unless they can have one also. This will result in extensions. It will also be possible to construct the tramlines at less initial cost, because the corporate bodies can obtain the necessary money at 3½ per cent., whereas few companies can get it for less than 15 per cent.; many are subject to 50 per cent. when all costs are counted. Admitting that a corporate committee is not always composed of men easy to deal with, neither is the directorate of a company. The committee may drive a hard bargain, but they will pay in cash, and that to a manufacturer is usually more acceptable than paper. The Lords' decision may therefore be fairly expected to result in more work and certain pay, though the profit may be small.

Respecting regulations and restraints, as already stated, the Board of Trade now wish to facilitate progress as much as possible. This is manifest by their decision anent the telephone and tramway companies, and by the conference held to consider the very important question of Light Railways, which opens out a wide field for electric traction in its various phases. There will, of course, be cases where electricity will not be the best power to use; some case where batteries may be better than direct driving if electricity is used at all; but it may be taken for granted that when the passenger traffic justifies the construction of a line, and when the advantage of a frequent service is fully realized (say a car holding 20 every half-hour instead of a train carrying 80 every two hours), then in the majority of cases, electricity by direct driving, in some form or other, will prove to be the best motive power.

For the cure of some of the other causes mentioned we must look to time, experience and patience, and a little more of that good fellowship which is usually associated with the incoming of a new year.

Prospects are certainly brighter than they have hitherto been. The way is open now, the skill is ready and waiting, but the means are still wanting, and those means are best obtained by concerted action on the part of all interested.

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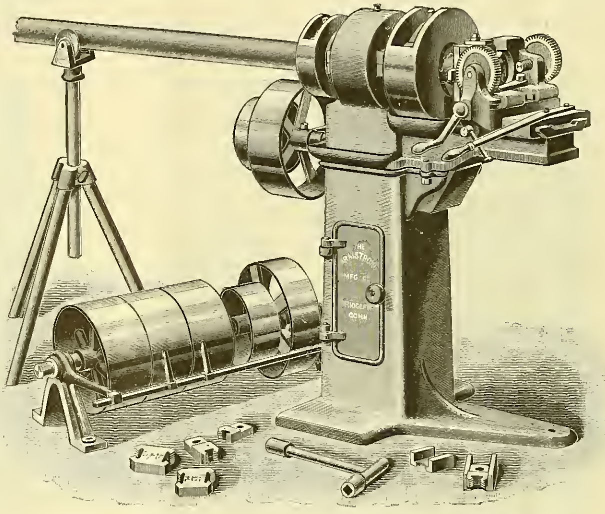
ARMSTRONG PIPE-THREADING AND CUTTING-OFF MACHINE.

The machine shown in the illustration is an improved form of the well-known No. 2 pipe-threading and cutting-off machine for hand or power, built by the Armstrong Manufacturing Company, Bridgeport, Conn. It retains the many attractive features of that machine in addition to others peculiarly its own. Is is very compact, rigid and durable, and does not require the services of a skilled operator.

All of the gears and working parts are inclosed in an oil-tight chamber, which insures their perfect lubrication and effectually keeps out dust, dirt and chips which might otherwise reach them and thus interfere with the perfect working of the machine. Ease of operation and long life to the vital parts of the machine naturally follow.



ARMSTRONG PIPE THREADING AND CUTTING-OFF MACHINE, No. 2½.

In one particular this machine differs essentially from all other pipe cutting and threading machines of its class built by the Armstrong company. In its operation the pipe revolves instead of the dies, being held securely by tight gripping chucks.

For radiator steam-coil works, etc., and other services where the greater number of pipes are of comparatively short lengths, this will be found a particularly desirable arrangement. The dies and cutting-off tool are held stationary, and are opened and closed by means of a double-geared crank handle, as shown. Expanding dies are used in connection with a self-centering and powerful gripping chuck, insuring speed in cutting off and threading a pipe. These are of the regular Armstrong pattern, and are furnished to thread from 1 inch to 4 inches, inclusive.

Quick interchangeability of the several sizes of dies, coupled with a construction which permits of separate adjustment for three different sizes, enables the operator to thread pipe to suit all variations in ordinary fittings, and to open and close the dies any number of times without changing the adjustment. Again, either of the sizes may be used alternately without change of adjustment, or the dies may be quickly taken out to permit of the free passage of the pipe to be cut off, and the adjustment still remain unchanged.

An objection frequently raised against machines using expanding dies is that employes are not skillful enough to use expanding dies without threading some of the pipe too large and some of it too small. This has been met and successfully overcome in the tool here shown. Though the dies are quickly opened after threading a piece of pipe, yet they may be as quickly closed together again without the least danger of variation, unless intentional. The weight of this machine is about 700 pounds; with countershaft, 850 pounds. Speed of countershaft should be about 225 revolutions a minute. The headquarters of the company are located at Bridgeport, Conn.

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FINANCIAL NOTES.

Purchase of the Macon Consolidated.—The Macon (Ga.) Consolidated Street Railway has been purchased by Tucker, Anthony & Co. from the General Electric Company. William A. Tucker will be treasurer of the company. There are $300,000 bonds on the property, and the stock is $500,000. The road has 25 miles of single track and operates 20 motor cars.

Against Grade Crossings.—Judge Emler, of Middletown, has introduced in the House of the Connecticut legislature a bill providing that after its passage no steam railroad in the State shall be crossed on grade by any electric, cable or horse railroad, nor shall any steam railroad cross any cable, electric or horse railway at grade. The aim of the bill is to prevent the Bridgeport Traction Company from laying its tracks across the New York & New Haven road at the Fairfield avenue crossing, near the Bridgeport railroad station.

Front Street Road (Seattle) Receivership.—O. D. Colvin, receiver of the Front street cable road of Seattle, Wash., has filed his report with the court. The liabilities are estimated at $949,649, including capital stock $600,000 and $300,000 bonded debt. The assets are fixed at the same amount, the value of the road equipment being estimated at $906,372. The company operates 5.47 miles of track, also the leased lines of the North Seattle Cable Railroad Company, consisting of 5,150 ft. of double tracks, the lines being operated by one continuous system.

Sale of the Gettysburg Railway.—The Gettysburg Electric Railway, of Gettysburg, Pa., has been sold to J. Luttrell Murphy, of Chicago, and Walter B. Kendall and John A. Connelly, of Philadelphia. The price paid is equivalent to $250,000. The purchasers obligate themselves to complete the road to the Maryland line, there to connect with the Maryland system of trolley roads. They are to obtain possession of the franchise on March 1, 1895, and in the mean time the present company will endeavor to settle the condemnation proceedings of the Government, which are now in process in the District Court of Philadelphia.

Merger Effected at Morristown, Pa.—A merger was decided upon this week at the annual meetings of the Citizens', the Norristown, the Montgomery County, the Sanatoga, Royersford & Collegeville and the Perkiomen Creek Electric Railway companies. Only two of those roads, the Citizens' and the Norristown, are in operation. The Sanatoga, Royersford & Collegeville, an extension of the Citizens', is in course of construction. The Montgomery County Railway will be the extension of the Norristown Railway from Bridgeport to West Conshohocken. The Perkiomen Creek line exists only on paper, but its construction in part, at least, seems to be assured. Hereafter the five companies will constitute one concern, to be known as the Schuylkill Valley Traction Company.

Little Rock Foreclosure.—In the United States Court, in Little Rock, Jan. 14, the celebrated cases of the St. Louis Trust Company and the Atlantic Trust Company, of Philadelphia, against the Little Rock Street Railway Company were disposed of. The cases were consolidated and by mutual consent a decree of foreclosure was entered. The dissolution of the receivership was directed and the property was ordered sold within 60 days. Captain T. B. Martin, of Little Rock, was agreed upon for master to conduct the sale. The case involved the loan of $650,000, advanced by the trust companies to H. G. Allis, who constructed the road. For the past two years the road has been in the possession of Col. S. W. Fordyce, of St. Louis, and Allen N. Johnson, of Little Rock, as receivers. The former represented the St. Louis Trust Company and the latter the Thomson-Houston and General Electric companies.

Trenton Litigation.—Chancellor McGill has issued a temporary injunction restraining the Trenton Passenger Railway Company from disposing of or encumbering its property pending a hearing on an application for a receiver on Jan. 22. The suit is brought by Samuel K. Wilson, a large stockholder and a director, who alleges that the company has not paid expenses for the past three years, and is insolvent. The condition, he says, is due to mismanagement of officers who transferred the controlling interest in the road to Thomas C. Barr, of Newark; E. J. Moore, of Philadelphia, and other capitalists, who organized the Trenton Traction Company, and are believed to be interested in the New York & Philadelphia Traction Company, which is seeking the right of way through Trenton. Mr. Wilson says the company has issued and sold $1,000,000 in bonds, given $75,000 in notes, which he indorsed, and has a floating indebtedness of $160,000, and he believes the recent transfers have been made with a view to freezing him out because he refused to consent to leasing the road to the Trenton Traction Company. A judgment recently obtained against the company for $18,500 by a local bank was paid by the new officers of the company.

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NEWS OF THE WEEK.

Baltimore, Md.—The Baltimore Traction Company has received from the Brownell Car Company, St. Louis, 10 new electric cars, which will be used on the Gilmore street line.

Lima, O.—The entire equipment of rolling stock of the Lima Electric Street Railway was destroyed by fire on Jan. 12. The car stable and 11 cars were burned up. The loss is about $30,000, only half covered by insurance. Operations have been suspended until new cars can be bought.

Fort Wayne, Ind.—Owing to dissatisfaction with one of the foremen at the barn and the discharge of four men a general strike on all the street-car lines of this city was ordered at a meeting of the Street Car Employees' Union Jan. 11. Only three men obeyed the order of the union, and all the cars have been running without interruption.

Chicago, Ill.—A State street cable train, loaded to the guards, going south at 8 o'clock last Wednesday, was run into by an Illinois freight train at the grade crossing between Fifteenth and Sixteenth streets. The cable train was cut in two by the collision, the rear car of the train, an Archer avenue trailer, was knocked off the track and thrown at right angles, the coupling connecting the chains and brake rods having been snapped asunder. Fortunately no serious damage resulted and only two persons were injured, their hurts being only slight.

Reading, Pa.—The Reading & Womelsdorf Railway Company has given to the Lancaster Electrical Construction Company the contract to build the road from the western bank of the Schnykill, opposite Reading, to Womelsdorf, and completed for operation by June 1. The tracks will be connected at the western end of the Penn street bridge, this city, with those of the Reading Traction Company, if the rails on the bridge are allowed to remain. The road will be 15 miles long, and negotiations are in progress to extend it to Schaefferstown, Lebanon county.

New York, N. Y.—The Aldermanic Railroad Committee considered a few days ago the repeal of the franchise of the Fulton Street Railway because it has failed to pay to the city the 30 per cent. of its gross receipts which it bid for the franchise. L. L. Kellogg, counsel for the company, urged that the franchise be put up at auction again. The company, he said, was insolvent, and the road was being operated by the contractor who built it and who has already sunk $100,000 in the venture. The road has never paid the city anything, and now owes about $50,000, which it seeks to compromise for $5,000.

Lockport, N. Y.—County Clerk Compton has received a communication from Chicago capitalists relative to building an electric railroad from Lockport to Olcott. They express themselves as being familiar with the territory to be covered and believe the enterprise would pay, but what they would like to be posted about is, if they should take hold of the enterprise, whether they could count on having any local backing, or at least obtain assurance that they would not meet annoying and expensive obstacles. Mr. Compton is looking the situation over with the view of answering the queries put to him, but as yet has not quite determined as to making his response encouraging or otherwise. What is generally considered indispensable to the success of the Olcott scheme is a road in this place, which, from the present outlook, owing to legal complications, is not likely to materialize for a long time to come.

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PERSONALS.

Mr. Charles E. Newton, of the Jewell Belting Company, of Hartford, Conn., was in New York this week.

Mr. William H. Shelmerdine has been elected president of the People's Traction Company, Philadelphia, to succeed Mr. Henry C. Moore, who recently resigned the position. Mr. Moore, who was elected general manager of the Trenton Passenger Railway Company a short time ago, will assume the duties of his new position at once. He will be elected president of the Trenton Company in a short time. Mr. Shelmerdine, who is well known as a director of the People's Traction Company, has been interested in passenger railways in Philadelphia for many years.

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TRADE NOTES.

The Standard Paint Company, of New York, has been distributing among its friends a novel, though useful, card case, strongly made and provided with an erasable tablet.

The Mather Electric Company, of Manchester, Conn., has been running its entire plant night and day for four months in order to keep pace with the growing demand for lighting and power apparatus for street railways.

Graphite as a Lubricant.—A third edition of this pamphlet has just been issued by the Joseph Dixon Crucible Company, Jersey City, N. J. The topic of which it treats is very fully discussed, and contains a great deal of valuable information.

The Van Choate Electric Company, a concern organized with a capital of $6,000,000, is making progress with the erection of its factory at Foxboro, Mass. When completed and equipped with tools it is intended to enter very extensively into the manufacture of electric car motors, generators, and lighting apparatus. Mr. Van Choate claims to have invented, patented and built ironclad multipolar machines fifteen years ago, and that every machine of this class now on the market is an infringement, for which he is going some day to demand damages.

Berlin Iron Bridge Company's New Contracts.—The new electric light station for the North Attleboro Steam and Electric Company, at Attleboro, Mass., has been completed by the Berlin Iron Bridge Company, of East Berlin, Conn. The building is 62 feet wide and 100 feet long, entirely fireproof, and covered with the Berlin Iron Bridge Company's patent anti-condensation corrugated iron. The same company is putting up a new retort for the Ellerslie Gas and Coke Company, at Winifred Junction, W. Va. The building is 66 feet wide and 84 feet long, with an iron roof covered with slate.

RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued Jan. 8, 1895.

532,016. Electrically-Propelled Vehicle; Henry C. Baker and John R. Elberg, Kansas City, Mo. Filed April 6, 1894. A brake is carried by the rear axle of the wheeled frame and a spring is carried by the bracket. The motor is yieldingly supported upon the spring, and electrically connected to the battery. Small friction-wheels are mounted upon the motor shaft, and large friction wheels are carried rigidly by the wheels of the frame journaled loosely upon the axle. (See illustration.)

532,031. Self-Adjusting Trolley; John Corcoran, Harrisburg, Pa., Assignor of one-half to Alfred T. Black, same place. Filed Aug. 29, 1894. Two shells have recesses to receive the standard, the standard fitting the recesses in the shells, and provided with a collar having stops formed thereon, and a pin on one of the shells and between the stops.

532,033. Safety Device for Inclined-Plane Railways; Patrick A. Deane, Scranton, Pa. Filed Aug. 11, 1894. A hoisting cable is attached to the car and a stopper is hinged by its forward end to the rear of the car, and a supplementary cable attached to the stopper and connected with the hoisting cable.

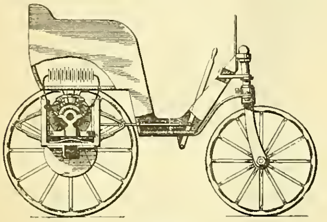
532,057. Motor Suspension for Electric Street Cars; Samuel Harris, Cleveland, O. Filed May 19, 1894. The motors are attached to and intergeared with the axles and the framework of the truck. The bars are pivotally connected at one end to each of the motors and pivotally supported on the truck by a rocking spring-bearing with their free ends meeting in the center of the truck. There are springs above and beneath the meeting ends of the bars, and a support for the springs rigid with the truck frame.

532,086. Fender for Cars; John E. McBride, New York. Filed Feb. 20, 1894. The fender has vertical and laterally-swinging movements, and is furnished with a centrally-located rail engaging wheel having a peripherical flange, and pivoted to the fender.

532,101. Insulator for Electric Wires; Daniel M. Rothenberger, Lancaster, Pa., Assignor of one-half to Charles A. Inglis, same place. Filed April 4, 1894. The insulator has a groove by the side of which a device is located that has one end adapted to take over and secure a wire in the groove, and a cap covering the connection between the insulator and the wire.

532,113. Converter System for Electric Railways; George W. Swartz, Florence, Ala. Filed Oct. 12, 1893. This is the combination of a bare conductor in sections insulated from each other, an outgoing circuit, a return circuit, and transformers each having its primary permanently inserted between the outgoing and return circuits, and having one pole of its secondary connected to a section of the bare conductor and the other pole to the rails, and a switch included in one of these connections, having an electro-magnet which is traversed by the secondary circuit when closed and the armature of which constitutes the movable switch member, whereby the secondary coil and coil of the switch magnet are in series.

532,126. Supply System for Electric Railways; Albert G. Wheeler, Chicago, Ill., Assignor to the Love Electric Traction Company, same place. Filed Jan. 21, 1893. Serial No. 459,238. In a two-track railway, having two sections, there are supply conductors, one for each track. The ends of the sections of one conductor are connected with the ends of adjacent sections of the other conductor to maintain an equilibrium of the supply current to the motors connected with the two sectional conductors. (See illustration.)



No. 532,016.

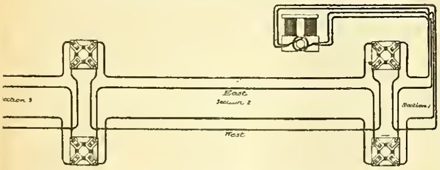
532,133. Trolley-wire Clip; Johan M. Anderson, Boston, Mass., Assignor of one-half to Albert Anderson, same place. Filed July 9, 1894. The ear is provided on its under side with arms integral with it and extended from the central portion toward the opposite ends of the ear. A substantially **U**-shaped clip secured to the sides of the ear and threaded adjusting bolts is carried by the ear and acts on the arms to force the trolly wire against the clip.

532,157. Underground Trolley Arm; Paul C. Just, Chicago, Ill., Assignor to Albert G. Wheeler, same place. Filed Jan 4, 1894. A flat supporting bar is made of two connected plates and provided with a recess at its edge having **V**-shaped notches formed by beveling transversely the edges of the plates at the upper and lower ends of the recess. A wearing block is inserted in the recess and shaped at its upper and lower ends to fit the notches.

532,160. Insulator; Myron D. Law, Washington, D. C., Assignor to Albert G. Wheeler, Chicago, Ill. Filed Aug. 29, 1893. The insulator comprises outer metallic parts and an inner apertured metallic part, a securing bolt passing through the aperture of the inner part and engaging the outer part. A sleeve of rubber, fiber, or other homogeneous insulating material is located within the aperture of the inner part and surrounds the bolt, and perforated discs or washers of sheet mica are interposed between the inner part and the outer parts, and which are clamped between the parts by the action of the bolt, so to exclude moisture from the interior of the insulator. The sleeve is made to loosely fit the bolt, but being adapted to take the strain coming on the parts in the use of the insulator.

532,161. Conductor; Myron D. Law, Washington, D. C., Assignor to Albert G. Wheeler, Chicago, Ill. Filed Sept. 28, 1894. An **L**-shaped rail has a contact flange and a supporting web, the end portions of the former being of half the width of the main portion.

532,163. Conduit Tramway; John C. Love, Philadelphia, Pa., Assignor to the Love Electric Traction Company, Chicago, Ill. Filed Sept. 5, 1893. The slot rails have inner and outer depending flanges and the cast metal yokes are provided at their upper ends with integral supports for the slot rails entering between the flanges thereof. Bolts pass through the outer flanges of the slot rails and into said supports, and act to clamp the rails laterally against the supports. (See illustration.)

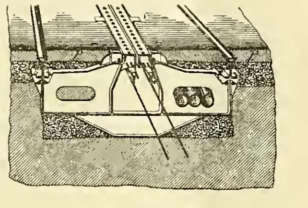


No. 532,126.

532,164. Conductor Support; John C. Love, Chicago Ill., Assignor, by direct and mesne assignments, to the Love Electric Traction Company, same place. Filed May 9, 1891. A supporting device for electric conductors is provided with a clamp comprising two separable plates, between the margins of which the conductor is gripped and held, one of which is apertured and the other provided with a loop projecting therefrom through the apertured plate. A wedge or tapered key is driven through the loop and engages the outer face of the apertured plate to force the plates toward each other.

532,165. Conduit for Electric Railways; John C. Love, Chicago, Ill., Assignor, by direct and mesne assignments, to the Love Electric Traction Company, same place. Filed May 9, 1891. A supplementary conduit pipe comprises integral tubular sections on the yokes provided at their outer ends with upper and lower curved flanges, and semi-cylindric upper and lower pipe sections resting at their ends respectively upon the upper flange and within the lower flange.

532,166. Tension Device for Electric Conductors; John C. Love, Chicago, Ill., Assignor, by direct and mesne assignments, to the Love Electric Traction Company, same place. Filed May 9, 1891. The tension device comprises a guide-rod or rods arranged parallel with the conductor, a sliding insulating block supported by said guide-rod or rods, a supporting clip for the conductor attached to the insulating block, a second insulating block also adapted to slide on the rod or rods, and having an elongated bearing thereon, a plate attached to the insulating block and extending toward the conductor, an adjustable coupling rod connected at its ends with the clip and plate, and a spring applied to act on the second insulating block for maintaining tension on the conductor.

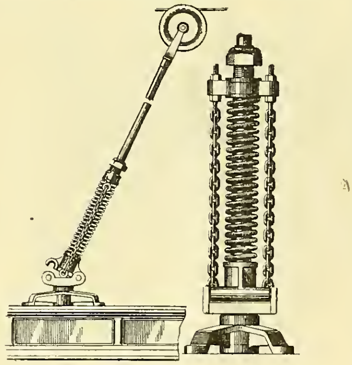


No. 532,163.

532,167. Electric Railway Trolley; John C. Love, Chicago, Ill., Assignor, by direct and mesne assignments, to the Love Electric Traction Company, same place. Filed May 9, 1894. The trolley arm comprises a relatively short section mounted upon a horizontal pivot, and a relatively long section carrying the contact device, and connected with the shorter section by a pivot arranged at right angles with the horizontal pivot. Means are applied to the lower section of the arm tending to rotate the arm about its horizontal pivot, and thereby hold the contact piece yieldingly against the line conductor.

532,168. Trolley Wire Clamp; John C. Love, Philadelphia, Pa., Assignor to the Love Electric Traction Company, Chicago, Ill. Filed July 11, 1892. Renewed Oct. 13, 1894. This is the combination, with a grooved wire, and an insulating block, of a clamping device consisting of two flat plates provided with lips or flanges at their lower edges to engage the grooves in the wires and one of which is embedded at its upper edge in the insulating block. There are means for securing together the plates, consisting of a single centrally-arranged, integral, screw-threaded stud on one plate, passing through a hole in the other plate, nuts applied to the screw-threaded stud, and one or more smooth studs in one of the plates fitting edges of sockets in the other plate.

532,185. Conductor Bond for Meeting Ends of Rails of Electric Railways; Peter Rieth, Chicago, Ill., Assignor of two-thirds to John McGeean and James McGeean, Filed June 14, 1894. The bond consists of a given length of conducting material, a plurality of perforated contact studs projecting therefrom, thimbles within the studs, perforations in the meeting ends of the rails and means for upsetting the metal of the studs within the perforations or holes of the rai ends within which the studs are located.



No. 532,195.

532,195. Trolley Support; Lucius T. Gibbs, Milwaukee, Wis. Filed July 28, 1893. Fig. 2 reads: "In a trolley support the combination of the stand adapted to be secured to the car and provided at its front and rear with cylindrical-bearing surfaces, the base adapted to sustain the pole and provided with semi circular grooves to receive the cylindrical bearing surfaces, the inner surface of said grooves being curved downward at their centers, and means tending to yieldingly hold the base in an upright position; whereby the base and pole sustained thereby may swing back and forth and also laterally in rounding curves." (See illustration.)

532,200. Trolley for Electric Railways John C., Henry, Westfield, N. J. Original application filed Sept. 27, 1889. Serial No. 325,244. Divided, and this application filed March 8, 1893. This is the combination of flat ribbon overhead working conductors, pendant supports connected to the middle thereof, contact and wear plates running on the conductors on the opposite sides of the supports, a frame pendant from the plates, a traveling motor and a mechanical and electrical connection therefrom to the frame. (See illustration.)

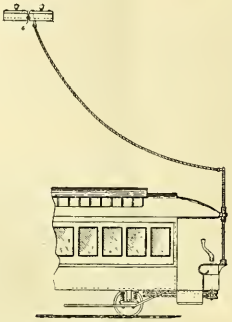
532,260. Cross-Arm for Support of Electric Wires. Edward J. Bullock, Wallingford, Conn. Filed Nov. 19, 1894. The cross-arm is formed from sheet metal of inverted **U**-shaped, and is constructed with holes through its top portion for the insertion of insulator-pins.

532,261. Conduit Electric Railway; Albert M, Burgher, Clay City, Ky. Filed April 17, 1894. The conduit comprises a track rail, a timber laid parallel with the rail, a top plate secured to the timber, and an insulating plate on the web of the rail adapted to support a line wire.

532,293. Rail; Charles Sill, New York, N. Y. Filed Nov. 3, 1891. A sectional rail has a longitudinal duct to receive and house the main conductor and has its sections spaced apart at one edge to form a longitudinal open recess adapted to receive a trolley wire. The rail is also provided with apertures affording communication between the duct and recess.

532,302. Closed Conduit for Electric Railways; Frank Windle, Philadelphia, Pa. Filed March 8. 1891. Spring plates are secured to the conduit and extend beneath the slot thereof and a trolley depresses the plates. There is a longitudinal support in the conduit, a conductor insulated from the support, and springs in contact with the conductor, having upwardly curved and oppositely-extending arms with which the spring plates engage.

532,339. Life-Saving Apparatus for Street-Car Platforms; William H. Rogers, Brooklyn, N. Y. Filed Aug. 6, 1891. The life-saving apparatus is composed of plates adjustably attached to the sides of a car, ratch-wheels, having pawls, pivoted upon the plates, supporting arms pivoted upon the same axles as said ratchet wheels, counterbalancing springs attached to the plates and to the supporting arms, carrying-wheels pivoted upon the supporting arms, a safety roller also pivoted upon the supporting arms and arranged to be brought in contact with the peripheries of the carrying-wheels, and a cradle attached to the supporting arms.



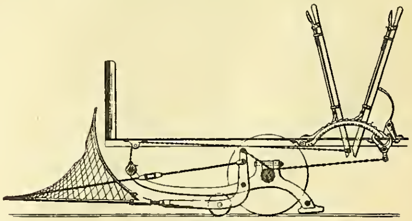
No. 532,200.

532,360. Safety Attachment for Cars; Robert Bustin, Boston, Mass., Assignor of two-thirds to John R. McConnell and James A. Van Wart, St. Mary's, Fredericton, Canada. Filed June 4, 1894. The hanging brackets have forked lower ends, and stretcher-bars are pivoted in the forks and extend rearward beneath lugs projecting from the rearward sides of the brackets netting is connected to the sustaining bars, at the forward ends of the stretcher-bars, and on the end-guard.

532,385. Fender and Brake, for Railway Cars; John T. Matthews, Baltimore, Md., Assignor of two-thirds to William H. Whiting and Mark Wells, same place. Filed March 7, 1894. The guard or fender is pivotally supported from a truck axle and adapted to be depressed by the weight of a person or object in collision. Brakes carried with and adapted to be automatically actuated from the fender, and mechanism is connected with the fender for automatically cutting off the power and applying the brakes when the fender is depressed by the weight of a person or object caught thereon. (See illustration.)

532,393. Guard for Street Railway Cars; William H. Paugh, Columbus, O. Filed June 25, 1894. This is the combination with the car and truck frames and spring hooks depending from said truck frame ends of a shaft journaled between the truck frame sides, a series of hook arms having their inner ends jointedly connected with the car frame, a supporting bail having its ends jointedly connected with said car frame and a trigger rod adapted to hook into engagement with said bale and adapted to be forced out of said engagement by the partial rotation of the shaft with which it is connected and means for partially rotating said shaft.

532,411. Illuminated Street Car Sign; James M. Allison, Indianapolis, Assignor of one-fourth to Andrew M. Banks, Marion County, Ind. Filed July 5, 1891. Standards are secured to the roof of the car, and a stationary reflector having lamps is secured thereto. A stationary shaft is secured to the reflector and standards. A revolving case surrounds the reflector and is mounted on the stationary shafts. A polygonal disk is secured to the revolving case, and a flat block having a resilient support engages the disk. Means are adapted so it may be operated from the car, revolving the case from the position of engagement, with the block, of one face of the disk to that of another.



No. 332,385.

532,420. Sand-Box Spout; Joseph Hirth, St. Louis, Mo., Assignor of one-half to Joseph Roof, same place. Filed March 5, 1894. In a discharge spout are a tube, a valve traversing the tube, and having a perforation, and a perforated plug located within the tube, and having a reduced lower end so as to leave a space between it and the interior of the tube.

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As the STREET RAILWAY GAZETTE is published 52 times a year, and is the only weekly publication devoted to Street Railway Interests, its value as an advertising medium will be apparent to Manufacturers and Dealers in Street Railway Apparatus and Supplies of every description. We will take pleasure in quoting rates for advertising space.

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New Jersey Street Railway Association.

Another State street railway association has been formed; this time the street railway men of New Jersey have enrolled themselves in an organization. A glance at the list of members shows that the association has strong men behind it, and it should be greatly instrumental in promoting the interests of street railway companies in New Jersey. The formation of organizations of this kind is timely and they should be liberally supported. Attack on street railway interests are contemplated in many quarters and the companies should be organized for mutual protection.

Electrolysis of Buried Pipes.

Mayor Schieren, of Brooklyn, recently announced that he believed that the solution of the problem of overcoming the electrolysis of buried pipes, due to escaping electric railway currents, had been solved, and stated that his belief was based on the results of a recent investigation. The report of Professor Barrett, to whom the work of investigation was entrusted, is presented elsewhere in this issue, but his findings seem to be hardly of a character to justify the confident prediction that an effectual remedy for the trouble was at hand. The suggestions that Professor Barrett makes in his report are not especially novel. He recommends first of all the obvious remedy of more perfect bonding of the joints. The necessity of affording a better return has been very keenly realized, and has compelled companies everywhere to make large expenditures for bonds of higher conductivity. All that can be accomplished at a reasonable cost in this way should be done, Professor Barrett says, but then it will still be found that the trouble has by no means been overcome. It remains to supplement a system of the best practicable bonding at points where leakage still continues by "a system of special return wires directly connected at brief intervals to the pipe mains." The application of these two remedies, Professor Barrett believes, will make the pipes "so far as regards the principal circulation of the trolley currents, virtually safe," though specific remedies would be required in exceptional locations. All investigations would seem to prove that the suggestions pointed out by Professor Barrett would, if adopted, minimize the trouble, but it is doubtful if they would overcome it entirely.

The Brooklyn Street Railway Strike.

The strikers and their sympathizers in Brooklyn shamelessly disregarded all their high sounding pledges to keep the peace, and the most disgraceful condition of affairs has existed in that city for the last week. The conduct of the men for the first two or three days was on the whole admirable, and inspired the hope that the strike might be distinguished by the absence of violence. The moment, however, that the companies determined upon a policy of aggressive opposition to the strikers, disorder broke out in all directions. If at that moment the municipal authorities had decided upon a policy of preserving the peace by the prompt suppression of lawlessness, by stern measures if necessary, much of the subsequent trouble might have been averted. The determination that the "nonsense must be stopped at any cost" was reached about a week too late Instead of announcements that violence would be instantly suppressed, interviews expressive of deep sympathy for the strikers were issued from the City Hall. A pacific course was followed in the hope that the two parties to the controversy would reach an agreement. There is no shadow of a doubt that the authorities were actuated by the best motives, but the policy proved to be the height of unwisdom. Temporizing and vacillation in the authorities encouraged the policemen in their inclination to show open sympathy for riotous strikers, and finally left them utterly helpless and unable to deal with the situation. The City of Churches became the most turbulent city in Christendom; the disorderly element became defiant and threatening, two brigades of soldiers were necessary to maintain any semblance of peace and order, and the original cause of the trouble was almost lost sight of in the effort to uphold the law. Had the authorities shown themselves in earnest when the trouble first manifested itself such a display of force would not have become necessary; had they been forced to do so by their superiors the police of Brooklyn could probably have overawed the mobs without military assistance. It is simply another illustration of the fact that the time to suppress violence, "to stop nonsense," as the authorities in Brooklyn put it, is at that instant when it first manifests itself.

There has been a vast deal written, and still more spoken in Brooklyn in reference to the alleged repudiation by the companies of their implied obligation to furnish to the public satisfactory transportation facilities. The strikers and their sympathizers, orderly and otherwise, loudly proclaimed that the companies' failure to operate cars should work a forfeiture of their franchise rights. The strikers pursued a consistent policy in this respect; they and their friends assaulted, kidnaped and intimidated non-union motormen and conductors, stoned cars, obstructed tracks, cut trolley wires and feeders, and committed other felonies in defiance of the law in order to make it impossible for the company to resume business, and then called upon the law to visit penalties upon the latter for the existence of the condition of things which made the operation of cars impossible. Judge Cullen, in a proceeding instituted to compel the companies to resume traffic, pointed out the injustice, in fact the nonsense, of such a contention, and made plain the idleness of any discussion whether the companies had sufficient men to fill the strikers places; whether they had or not they could not have a chance to demonstate the fact until order was restored. At the time of this writing the presence of an armed force of 5,000 men co-operating with the police force is having its effect and by degrees the turbulent element is being forced into subjection. The companies are resuming service on their lines as rapidly as could be expected, considering the fact that the new employees cannot yet be promised absolute protection from assault while they are making their trips; on some of the lines the service is as satisfactory during daylight as during the ante-strike period. The situation as it appears at this time affords another forcible illustration that a strike attended by violence stands an extremely poor chance of success.

MANDAMUS TO COMPEL STREET RAILWAY OPERATION DENIED.

An interesting proceeding was instituted by a merchant of Brooklyn last week, which was an immediate outcome of the street railway strike in that city. Peter H. McNulty made an application for a writ of mandamus to compel the Brooklyn Heights Railway Company to operate its cars. At the hearing on the return of the order to show cause why the writ should not be issued, the affidavit of Mr. McNulty was read. He stated that his place of business was at the corner of Fulton street and Bedford avenue, and alleged that relying upon the terms of the charter granted the railroad company he had invested about $150,000 in the business, and in addition, large sums in the purchase of certain real estate throughout the city. This was on the understanding that the railroad company should continue to operate its lines of surface cars on Fulton, Putnam, Franklin, Nostrand and Tompkins avenues. Owing to its present failure to do so, he said he was losing thousands of dollars in his business and that his real estate was depreciating in value. He deposed that intending customers were prevented from reaching his store and that his employees could not get to and from their business. All this was due, he alleged, to no fault of customers or employees, but to the fact that the railroad company refused to pay the men a fair and just rate of wages for their services.

The company's cosnsel, Thomas S. Moore, presented the company's side of the case. Mr. Moore said his company denied, on information and belief, that Mr. McNulty depended on the railroad for the success of his business, or that he had invested therein $150,000 relying upon any agreement of the company; that his real estase is decreasing in value; that he is losing thousands of dollars a day, or that he has been irreparably damaged. The petitioner has set up that the company employed a large number of trippers at 20 cents a day and refused the demands of the men to abolish them and agree to $2.25, $2, $1.75 and $1.50 as the scale of wages. This, Mr. Moore said, the company denied. The company admitted that $2 a day was a fair market value of compensation, but that the men had refused to accept it. The company had also declined to run their cars according to the suggestions of its employees. On information the company denied that thousands of people had been prevented from visiting the petitioner's store daily and that the company was now operating its lines to the best of its ability with due diligence and effort.

In addition Mr. Moore said that the company showed that it operated 200 miles of tracks. That on January 14, without previous notice, its entire force of employees left their work or failed to report for duty. The company at once published an advertisement in four separate newspapers for men to take their places. In answer many persons had applied for work. All those fit to enter the service were being employed and assigned to duty. On Jan. 14, at 9 A. M., cars on the Court street line were placed in service, and on the same day those on the Flatbush avenue line. On the 17th the Putnam avenue and Halsey street cars began running, the resumption being attended with considerable violence. On the 18th the Fulton street line was opened. It had been found necessary to secure police protection to do this. But it was not sufficient, and the city authorities had advised the company not to resume its full service all at once. Any failure to place the entire car service running was due to the advice of the authorities of the city, who had sought to evade any cause or apparent cause for violence. Mr. Moore declared that his company had men enough to operate its lines if there were no fear or threats of violence. In short, it was at present exercising the terms of its charter to the best of its ability.

He read a short affidavit made by President Lewis, in which the latter deposed that ever since the commencement of the strike he had kept in communication with the police and had acted on the advice of the authorities.

Affidavits of several citizens and employees of the railroad were read as to especial acts of violence committed by the strikers.

In denying the application for the writ Judge Cullen said:

"There is no question about the duty of this company to operate its road. If a bridge on a line of a railroad should burn down, of course the railroad could not be operated. In a case of a blizzard, of course it would be impossible to operate a road. Now, this company has a question with its men who are on strike. The Court has nothing to do with the terms demanded by these people. The company has the right to get its men as cheaply as it can, while the men have the right to get the biggest price they can and combine together. On the question of wages each has the right to make the best terms they can. As between the company and the men, if the men are in a position to dictate terms there is no reason why they should not do so. But the duty of the company to operate its road is to be exercised reasonably. In its operation the company is absolutely entitled to the protection of the authorities and to the protection of the Court. The Court cannot shut its eyes to the fact that assaults and violence have been committed, and that detachments of police are scattered all over the city. The community owes a duty of protection to the company in operation of its road. As long as the acts of violence continue the Court certainly will not compel the road, by mandamus, to operate." Then turning to the counsel of the company his honor added: "You can call on the authorities for protection and then go on and make the test by operating your road. You should make an attempt to operate cars. We will then see whether law and order cannot be maintained in this community. I will deny the application, with leave to renew, if the company fails to operate. I do not think there was a question of fact to warrant the issuing of an alternative writ. The company has a sufficient reason for failing to operate its roads, but it should not be extended."

FAILURE OF THE LEWIS & FOWLER MANUFACTURING COMPANY.

Charles Dobbs has been appointed receiver of the Lewis & Fowler Manufacturing Company of Brooklyn. The application on which the court made the appointment was made by the company which alleged it was necessary for the protection of creditors. The failure of the company is attributed to hard times and slow collections, and it is also asserted by some of those interested that the affairs of the company have not been skillfully managed. The company has done a large business in years past in the manufacture of cars, fare registers, car stoves and car trimmings, and at one time gave employment to as many as 500 men. Its stock has been quoted as high as 160. The factory is now practically closed and most of the employees have been discharged. The plans for the future are as yet indefinite.

NEW JERSEY STATE STREET RAILWAY ASSOCIATION.

In Jersey City last week the Street Railway Association of New Jersey was organized. The call for the meeting which had been sent out was signed by Garret A. Hobart, president of the Paterson Railway Company; Thomas C. Barr, president of the Trenton Traction Company, and E. F. C. Young, president of the Consolidated Traction Company of Jersey City. The meeting was held at the office of the Consolidated Traction Company, and the following companies were represented: Camden, Gloucester & Woodbury Railway Company, Camden Horse Railway Company, Newark & South Orange Railway Company, North Hudson County Railway Company, Consolidated Traction Company, New Brunswick City Railway Company, Paterson Railway Company, Paterson Central Railway Company, New Jersey Electric Railway Company, Trenton Passenger Railway Company, and the Jersey City, Hoboken & Rutherford Railway Company. Letters were received from several street railway companies in the State promising to join the association. The association adopted a constitution in which the purpose of the organization is stated in the first paragraph as follows:

"The objects of this association shall be the acquisition of experimental statistics, and scientific knowledge relating to the construction, equipment and operation of street railways, and the diffusion of this knowledge among the members of this association, with the view of increasing the accommodation of passengers, improving the service and reducing its cost, the establishment and maintenance of a spirit of fraternity, and the encouragement of friendly relations between the roads and the public, and to foster and protect the large investment of capital in these important enterprises."

The following officers were elected: President, David Young, of Newark, general manager of the Consolidated Traction Company; vice-president, G. S. Browning, of the Camden Horse Railway Company, and secretary and treasurer, William B. Price, manager of the New Brunswick City Railway Company.

NEW YORK RAPID TRANSIT.

At the last meeting of the New York Rapid Transit Commission a bill to be presented to the legislature was considered, making amendments to the present rapid transit legislation. The proposed amendments were not made public, but it was understood that the Commissioners are in favor of increasing the limit of expenditure and extending the time limit. Mayor Strong, who is an ex-officio member of the Commission, has made this statement regarding the situation as he views it:

"I am going to see that the rapid transit which has been promised for such a long time is a reality. I have been so busy that I have not had time to attend the meetings, but I will endeavor to do so in the future, and the people can rely on it that the work will be actually begun as soon as possible. Now, I am opposed to having the road built not as it should be because the $50,000,000 limit would have to be exceeded. I believe that as much money should be spent as is absolutely necessary to build the road as it should be constructed. I hear that the Commissioners are going to ask the legislature to amend the statutes bearing on the rapid transit road, and I favor the proposition to amend them so as to permit enough money to be spent to make the road a success."

MEIGS SYSTEM IN BOSTON.

An application for location to build an elevated railway system in Boston has been filed by the Meigs Elevated Railroad Corporation. The location is as follows: From a point on Main street, near Sullivan square, in Charlestown, Main street, to City square, Warren avenue, to and over any existing bridge or over a new bridge across Charles river, to Beverly street, to Haymarket square, to Union street, to Dock square, through a new street which shall be built by the city, 80 ft. wide, and one-half of the cost of which shall be paid by said corporation, in the line of Congress street, between State street and Dock square, Congress street to Postoffice square, to Federal street, to and over Federal street bridge, or a new bridge across Fort Point channel, to and through Dorchester avenue to the Milton line. The company asks also for rights for eight branch railways.

It has been announced that the projectors of the Meigs system have been making an effort to secure in New York the money needed for the construction of the railway.

New York, N. Y.—Two rear-end collisions occurred during the fog on the cable road on the Brooklyn Bridge last Monday night. One accident occurred at the Brooklyn side and the other at the New York terminal. Three persons were injured, but not seriously. The accidents occurred soon after 5 o'clock when the traffic on the bridge is greatest. For an hour and forty minutes the cable road was shut down, and would-be passengers were obliged to walk over the promenade in the rain.

STREET RAILWAY STRIKE IN BROOKLYN.

During the first few days of the Brooklyn street railway strike the companies made no great effort to move their cars, and consequently there was little disorder. When the strikers realized that there was no disposition on the part of the managers to accede to their demands, but on the contrary were preparing to operate their lines with new men, there was an outbreak of violence all over the city. The disorder was scarcely sufficiently dangerous to be designated as a riot, but scores of more or less serious disturbances occurred which alarmed the authorities, but still did not at first cause them to resort to measures active enough to put an end to the trouble. They hoped from hour to hour that an agreement might be reached by the companies and their old employees, so that drastic measures would be unnecessary. This plan of temporizing proved to be the worst possible way of dealing with the situation. The police were from the first in sympathy with the strikers, and were glad enough to fall in with the policy of dealing gently with the class that resorted to physical violence. It was easy enough to predict what the result would be. The strikers proclaimed with triumph that the municipal authorities and the police were strongly in sympathy with them, and the lawless element at once took the position that little risk would attend open attacks on the property or the new employees of the companies. The attitude of the police force strongly favored the correctness of this prevalent notion. Instances running up into the scores are on record of policemen standing by inactive while conductors and motormen were assaulted, while cars were stoned and while obstacles were placed on tracks. Undoubtedly the police force at the beginning of the trouble was abundantly able to quell all disturbances and stop effectually the activities of the rioters, but when the policy of temporizing was continued day after day the disorderly element became so bold and defiant that the authorities woke up to a realizing sense that they had allowed a very serious condition of affairs to develop. At that minute they determined to appeal to the militia for assistance in putting an end to the hourly disturbances and incipient riots that disgraced the city.

TROOPS AT THE HALSEY STREET CAR-HOUSE.

It is unnecessary here to dwell on the fact that the old employees were not altogether responsible for the lawlessness that existed for so long a time. A large number of the disturbers of the peace were sympathizers, and others belonged to that class which is always ready in every great city to engage in law breaking if detection is rendered difficult because of numbers. It is, however, the fact that a great number of the ex-employees engaged in unlawful acts in obstructing cars, but more particularly did they violate the law by assaulting the men who had taken their places. When they found that the companies were not likely to recede at once from their position, but that they stood a good chance of losing their means of livelihood they became ugly tempered and took summary vengeance on the new men. The wretched cowardice that the strikers showed in waiting for a good chance to pitch on these helpless men who were minding their own business caused a vast decrease in the public sympathy for the strike. Refusal of the Brooklyn policemen to offer protection when they could have afforded it in so many instances of this kind was one of the humiliating features of these frequent disorderly incidents.

Gen. Robert Avery, of Brooklyn, made a public protest against the attitude assumed by the police. He said:

"The police of Brooklyn are either incompetent to handle this situation, or they are cowardly, or they are in sympathy with the strikers. They can take either horn of the dilemma. The police of New York may be thieves and blackmailers, but they are not cowards. As for myself, I prefer thieves and blackmailers to cowards. Why, there is no protection whatever afforded by the police here. The other day a car containing 15 policemen was attacked by a mob who dragged the motorman to the street and brutally beat him. Behind the car was a police patrol wagon with 12 men. Yet, with those 27 officers present not one arrest was made. The police neither club the strikers nor arrest them. They haven't arrested a striker. Now, this is a pretty state of affairs. I say that an administration which cannot meet a situation like this is not a competent administration. I have nothing to say as to the justice of the demands of the strikers for more pay. They have the right to strike, but they have no right to interfere with others who do went to work."

With disorder and violence on every hand, when motormen and conductors were continually assaulted, it is not surprising that the companies did not at first make much progress in starting their lines that had been tied up by the strike. A great many of the men who were ready to take out cars were scared away by the attack on those who had been out on the road. This result was, of course, anticipated by the strikers, and the hope of inspiring others with fear of this kind impelled them to keep up this sort of warfare. Quite a number of men who could not be terrorized and who would not yield to threat or entreaty were bought off by quite handsome presents of money. The use of money in this way cut a greater figure in this strike than is usually the case. It is a praiseworthy plan of procedure to bribe men in comparison with disabling them by physical violence.

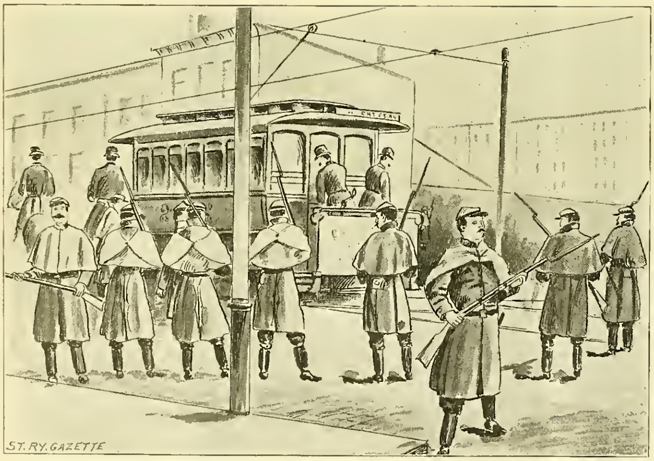
FIRST BATTERY OF ARTILLERY AT ALABAMA AVENUE CAR-HOUSE.

The companies worked under advice from police headquarters. They operated only such lines as the authorities gave them assurance could be adequately protected. This course was undoubtedly wise, and would have worked well had the police been braced up to do their duty, but as it has been heretofore remarked, they failed in this respect most lamentably. The companies endeavored to fulfill their guarantee of protection to their new men, but the inactivity of the police made it hard for them to fulfill it. Toward the close of last week the companies grew tired of this sort of thing. They announced to the authorities that the waiting policy would have to come to an end: that the public was demanding means of transportation; that they had a public duty to perform, and they proposed to do it; that they had men to operate their cars, and were ready to send them out if such protection were afforded as they were entitled to under the law: that they proposed to start their cars and to hold the city of Brooklyn responsible for what occurred. To judge from newspaper reports this announcement, which was made by President Norton, of the Atlantic Avenue road, struck terror into the hearts of the local authorities. They then lost no time in calling out troops, and Brooklyn assumed a most warlike appearance.

CALLING OUT THE MILITIA.

The decision to call out the militia to aid in preserving the peace was determined upon on Friday, Jan. 18. The violent demonstrations of the day and the apathy of the police led to some warm criticisms of the municipal officers by the management of the roads. President Norton sent a letter to Police Commissioner Welles, in the course of which he said:

> We have a large number of men on hand, under pay and willing to work at a moment's notice, and it is my desire that the public be inconvenienced no longer.
>
> As I have heretofore said, I believe it may be necessary, in order to do this, to augment your forces by the militia. At the same time you know your business best.
>
> With the proper protection it will not take us longer than three days to have every wheel turning which we own, and I would be glad to have co-operation from your department commensurate with our desires.
>
> Won't you kindly advise me, either to-night or the first thing in the morning, what we may expect?
>
> A determined effort will have more to do with bringing the entire matter to a focus than anything I know of, and, above all, the public should not be required to walk any longer.



STARTING A CAR FROM RIDGEWOOD.

Secretary W. A. H. Bogardus, of the Brooklyn Heights road, made a statement in which he asserted that President Lewis and the officers of the company had grown tired of the delay and shilly-shally policy of the city authorities. The company, he said, had 700 new men engaged, of whom 200 were idle. Any number could be had, in addition, at extremely short notice. He said that so far the company had been at the absolute dictation of the police, and that it was because of Commissioner Welles' orders that its lines had not been run a night. Not a car had been moved without Mr. Welles' permission. "The protection that the police have afforded us," he said, "is absolutely inadequate, and there never has been a pretense that it was otherwise. We have run cars without a soul aboard, except the motorman and conductor, because the police failed to give us protection. Here is an example," he said, referring to a man badly disfigured, who just came into the room.

"There is a man," said Mr. Bogardus, "who tried to take a car out last night. Oh, we have many more like him. We've got a hospital in another room. Our office telephone is rung constantly, and conductors and drivers say to us 'I'm afraid to come down for fear I'll be killed, but for God's sake keep my car for me. I'll come as soon as I dare.' And all the time Commissioner Welles says to us 'Go slow and wait for us. We'll protect you.' We have asked for protection 20 times, and every time we've got it we've run cars. We tried in every reasonable way to settle the strike from the start, but the executive committee has said: "We tie up first and settle afterward. We have asked Welles 20 times a day, 'Let us run cars: let us start this road,' and he has said continually, 'No; you had better not. Leave it to us and wait.'"

Stretch of Track on Bergen Street.

This plain exposure of the helplessness of the police was followed by a prompt admission from Mayor Schieren that he did not have force enough to preserve order or to give the companies a fair chance to resume business. Reports came in that lawlessness had broken out in a score of different places and added to the feeling of insecurity.

The militia responded promptly to the call of the mayor, and over 2,000 were assigned to the work of preserving the peace. The military officers followed the plan of utilizing the National Guard to protect the stations and car barns of the railroad companies, while the police were detailed to patrol the trolley lines and to protect the cars and the men in charge of them.

The authorities notified the companies that protection could be afforded, and that they could start as many cars as they wished, but it was speedily found that the lawbreakers had by no means been overawed by the presence of the blue coats. Violence continued whenever cars were sent out, and the service could not be resumed. The ranks of the companies' new men were constantly thinned by deserters who had been intimidated by the strikers, so that they were not at once able to start as many cars as they had expected. Conflicts between the soldiers and the lawless element were of frequent occurrence, and on Saturday night charges with fixed bayonets were repeatedly made on the crowds that thronged about the car barns. A few persons were slightly injured in these encounters.

In response to a call of the authorities, the First Brigade of New York was called out to aid in suppressing the disorder, and the reinforcements appeared in Brooklyn on Monday. As a result of the added military the city was freer from serious riots. The cars of the several companies were operated with greater regularity and more frequency than at any time for a week. The city was placed under partial martial law. To that effect the mayor issued a proclamation to the people to keep off the streets. Crowds continued to gather, however, at every one of the railroad depots.

With all this display of military the rioters could not be held in check by the police. A vast amount of criticism of the companies appeared in the papers because they failed to give satisfactory service, but an account of one effort to resume operations will explain the reasons for their inability to start many of their lines. It was decided on Monday afternoon to send a car from the Ridgewood barn over the Gates Avenue line. At five o'clock the car was sent out with 3 policemen on the front platform, 5 on the rear, 25 police lined up at the sides and two mounted officers. Reporters were passengers Companies A, F, and H of the Seventh were withdrawn from picket duty and formed in front of the car, which, with 300 troops and 33 police guarding it, was slowly advanced.

The car moved only at the rate the troops marched, but when it had covered a block a heavy piece of crockery or glass was thrown and struck the car on the roof. A crowd of men in a vacant lot seemed to regard this as a signal, for the crash on the roof was followed by a rain of stones and rocks, directed as much at the men of the Seventh as at the motorman and his police guards. One of the policemen, seeing a man about to throw a rock shouted to him to drop it. The man threw it. The policeman whipped out his revolver, aimed at the man, and then fired in the air. The crowd ran then, and the march was resumed, every policeman having his revolver drawn and a detail of the Seventh in the front and rear having their muskets loaded.

At the next corner there was a sharper attack by the mob, which had run down parallel streets on both sides and came together at the crossing. The mob parted to let the militia pass, but when the car reached the corner there was a banging of rocks from each side. The foot police charged, and the mob retreated, but slowly. The mounted police then charged, driving the mob a block each way down the side streets, and firing a single shot in the air after each section of the mob.

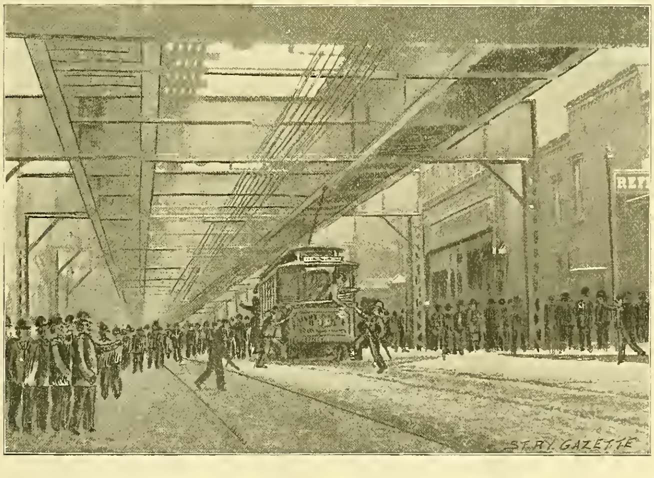
Up to that time only three shots had been fired, and they had not produced the desired effect, for at Knickerbocker avenue the mob, increased in number, sent in another hot volley of rocks and bricks. As the foot police charged the mob fell back, sending in repeated volleys of stones as they retreated. Then the police made a longer and quicker charge, firing as they ran.

That experience drove the motorman in from his post, his place being taken by the electrician of the line. At the next corner hostilities were renewed by a pistol shot from a window. Some of the Seventh men saw a man leaning out of a tenement window with a pistol in his hand. A dozen rifles were pointed at him, and the order to fire was given. A dozen musket balls whizzed past the man, sent just near enough so that he would hear them ring. His and a hundred other windows were banged shut. The mob fired the usual volley of rocks and made the usual retreat under pistol shots fired in the air.

The car proceeded slowly. A brick thrown from a saloon crashed through a car window and struck a reporter. At Evergreen avenue the mob had increased greatly in number, and at that point seemed determined to make a stand. Rocks, bricks, stones and pieces of iron rattled on the car, through the car, and on the heads of militiamen and police. These missiles came from the streets. from windows and from housetops. The police were firing in the air, but the harrassing vollies kept up.

Then the detail of Seventh men who had been ordered to load and told to fire at their discretion sent a volley over the heads of the mob. Even then the assailants did not give much ground, and the police at last lowered their revolvers when the mob broke. From that point until Bushwick avenue was reached the militiamen kept their guns pointed threateningly at windows, greatly reducing the annoyance from that direction, and the police did not wait for an attack before firing their pistols over the heads of men who looked suspicious. At Bushwick avenue the police said that the "danger zone" was passed, and the battalion of the Seventh turned off and marched back to the Halsey street depot. There were a few scattering attacks until the car reached Broadway, but after that the much-battered car with its much-relieved passengers proceeded to the bridge unmolested.

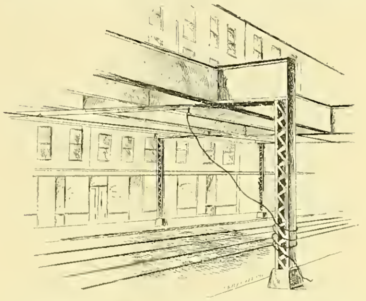
When the operation of cars was attended with such results the fact that the companies did not open up their lines more speedily was not surprising. Incidents of this kind did not bear out the assertion of authorities that the companies were afforded the protection necessary to enable them to resume business.



CONDUCTOR AND MOTORMAN COMPELLED TO ABANDON THEIR CAR.

The following few days of the strike were characterized by few new developments. The mobs continued in their attacks on the new employees, and conflicts with the police and soldiery were of frequent occurrence, but the disturbances grew less serious each day. The police became more alive to their duties, a result that was especially due to the fact that the lawless element showed no disposition to discriminate in throwing missiles, and some of the officers were injured. Arrests began to be more frequent and two persons paid with their lives the penalty of refusing to obey the orders of the soldiers; as it commenced to be appreciated that personal danger would attend open lawlessness the strikers and their sympathizers adopted new tactics. Trolley wires were cut in scores of places, and in some few instances feeder cables were severed. In some cases the wires were grounded by winding them about trolley poles or the pillars of the elevated structure. Several times the companies found themselves unable to start lines in the morning, as circuits needed repairs in so many points. Several persons were arrested for misdemeanors of this kind, and all were found to be strikers.

It was thought on Wednesday that the service on several of the lines would be absolutely crippled, as it was announced that the leaders of the strike had induced the linemen to stop work and join the strikers. In anticipation of this result a vast number of wires had been cut by the strikers. It was discovered, however, that many of the linemen refused to resign their positions, as they were satisfied with their pay and their hours of labor. While the companies were inconvenienced by the desertion of some of these men, they were able to keep their wires in fair repair.



How Trolley Wires Were Cut and Grounded on the Elevated Structure.

All this time the service on the lines was gradually improving. The difficulties in the way of securing new men, courageous enough to brave the mobs, were not easily overcome, but by Thursday night it was believed that the strike was broken.

ACTIVITY OF THE ARBITRATION BOARD.

Since the commencement of the strike the members of the State Board of Mediation and Arbitration have been making frantic efforts to settle the controversy and thereby demonstrate their usefulness. They came quite near to arranging a compromise between the Queens County and Suburban Company and its employees, but failed at the last moment, because the company refused to discharge the men whom it had hired since the strike was declared. The board held sessions at which testimony bearing upon the strike was taken, and arranged conferences between the companies and their old employees, but its efforts resulted in nothing of importance. On Monday the board prepared a report, which was submitted to the legislature. In the course of the document, the board says:

"A strike of the employees of the five electric surface street railways of the city of Brooklyn, who are members of District Assembly No. 75, Knights of Labor, employing nearly all the operating forces. took place on Monday morning, Jan. 14. The Coney Island & Brooklyn Railroad Company alone effected a settlement which enabled it to continue business without interruption. This board made every possible effort to settle the differences between the other companies and their men, but was successful only in the case of the Brooklyn City & Newtown Railroad Company, with which, and its former employees, an agreement was brought about, and contract signed, under which traffic was resumed Thursday morning, and still continues without interruption.

"Investigation of the causes of the strike was made and it was ascertained that it proceeded from failure on the part of the Executive Committee of District Assembly No. 75. K. of L., to effect a renewal of the contract of 1894 with the companies for 1895, with certain proposed changes, which involved. principally, an advance of wages from $2 to $2.25 per day to conductors and motormen, who form the bulk of the employees; an establishment of the proportion of permanent regular runs to special trips made for accommodation of congested travel at certain times of day, and an observance of the statute which prescribes 10 hours' labor performed within 12 consecutive hours on street railways as a day's work. The demand for an increase of wages was finally withdrawn. and the other two points of difference, which the men deemed vital, remained in the cases of the Brooklyn Heights and Atlantic Avenue Companies, while the Queens County & Suburban Company was willing to yield them, but could not effect settlement, because of the individual contracts made with new men, which would prevent the return of a number of the old men. and to this the Executive Board of District Assembly No. 75 would not assent.

"However. the existing troubles on the Brooklyn street railways may be settled, the statute with regard to the hours of labor will, unless amended so as to explicitly state and settle what shall contitute 10 hours' labor, remain a constant irritant and source of dissatisfaction and contention on the part of the employees. The companies construe and enforce the words '10 hours' labor' to mean labor while the cars are moving upon the rail, without taking into account waiting time at either end of the routes. Thus, by the evidence taken it was shown that upon one line, where there were eight regular runs a day, there was waiting time of three minutes at each end, making 48 minutes per day, during which the conductors and motormen were on duty and in charge of their cars, but for which they received no compensation. However this method of computation of time of labor came to be established, it is clearly not within the terms or intent of the law, and is not just, as the employees contend. With a view, therefore, to removal of this cause of the present strike, and prevention of its agency in working further trouble on lines of street railroad. it is suggested that Chapter 529 of the Laws of 1887 be amended so as to prescribe that the '10 hours' labor to be performed within 12 consecutive hours, with reasonable time for meals,' provided for as a day's labor, shall commence when the employee reports for service, as required by the rules of the employer. and cease when the employee, upon their expiration, is relieved from duty for the day."

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NATIONAL ELECTRIC LIGHT CONVENTION IN CLEVELAND.

C. O. Baker, Jr., master of transportation of the National Electric Light Association. announces that the Trunk Line Association has granted a rate of a fare and a third. on the certificate plan, for the round trip, to members and delegates attending the eighteenth convention. to be held in Cleveland, O., Feb. 19. 20 and 21. Negotiations he says, are now pending for a special train from New York, to Cleveland, notice of which will be given as soon as route is selected and schedule arranged.

In addition to the published list of papers to be read at the Cleveland meeting, Nelson W. Perry will present a paper entitled "The Storage of Energy Essential to Central Stations: How It May be Accomplished and the Economies Resulting."

Professor Langley, of Case School, and Professor Stine, of Armour Institute, Chicago, will take part in the discussion. The topic, "How to Light Large Cities," will be discussed by Frederic Nicholls, Charles R. Huntley, Frank H. Clark, J. Frank Morrison, T. Carpenter Smith, George A. Redman, E. F. Peck, and others.

* * *

INVESTIGATION OF THE ELECTROLYSIS OF PIPES BY ESCAPING ELECTRIC RAILWAY CURRENTS IN BROOKLYN.*

BY PROF. JOHN A. BARRETT.

The most considerable part of the time and labor with us has been occupied in securing measurements upon the electrical status of the public water pipes by tests chiefly made at the street hydrants along the lines of the trolley roads. From figures thus obtained the map accompanying this report has been prepared. In this general survey measurements were made at 660 hydrants, covering somewhat over 100 miles of street. The full system of measurements comprised taking differences of potential between hydrant and rail, between hydrant and at least three earth points and between the same earth points and the rail; and in some instances between hydrant and gas pipes and between hydrant and elevated railroad structure. The differences of potential discovered by these measurements indicate whether there is a tendency of electrical current to pass either to or from the water pipes in the vicinity of the hydrant under observation, and also the degree or intensity in which such a tendency exists. In other words, the figures representing differences of potential between the hydrant and the earth or conductors embedded in the earth, correspond with conditions of electrical pressure acting either from or toward the water pipes within a limited distance of the hydrant. As a basis for estimating the practical value of these figures, it is to be noted that a current of electricity entering upon the pipe from the earth does not promote the corrosion of the pipe at the surfaces by which it enters. If such a current has any material influence it rather retards natural corrosion. It is where a current of electricity passes from the surface of a pipe into the earth or into any wet or watery conducting medium that the corrosion of the pipe is actively stimulated.

Consequently when the measurements indicate that the electrical pressure is toward the hydrant the water pipes in that vicinity are regarded as for the present comparatively safe from damage by the trolley currents, but when the direction of pressure is outward from the hydrant then the neighboring water pipes are believed to be under a liability of accelerated corrosion. It is to be further observed that a pressure outwardly from a pipe merely indicates a liability to corrosive action, and does not necessarily determine the existence and locality of specific instances of damage. Considerable differences of potential may exist from the pipes to the railroad system, where there is an absence of suitably associated conditions of conductivity in the earth, and where consequently there will be no current sufficiently localized to produce material damage. On the other hand, smaller differences of potential, together with favorable conducting paths through earth or water, will cause rapid destruction of the pipes.

In general the conditions existing in Brooklyn concerning the trolley earth currents are similar to what are reported from other large cities. The single trolley is the only system in use here. The positive pole of the generators is connected to the outgoing trolley wire. The current descending from the overhead wire through the cars of the system to the rails seeks a return to the power station, and in its return distributes itself naturally over the several paths offered to it. In proportion to the superior conductivity of the rail and supplementary and special return feeders the principal part of the current harmlessly follows these proper conductors back to its source. But it is found that even with the most expensive system of return conductors provided by any of the Brooklyn roads the potential of the rail throughout the central portions of the city and in districts remote from power station is generally higher than that of the earth and water pipes, and that consequently there is in these districts a continuous passage of current from the rails through the earth to the water pipes.

It has previously been stated that this passage of current to the pipes is not the occasion of damage in the localities where it occurs. But all the electricity which is received by the pipes in such localities must pass along the pipes to other places where it will leave the pipes, and where it will produce an amount of damage proportioned to its volume and the concentration with which it flows. The places where the accumulated current chiefly tends to leave the pipes are found to constitute well-defined districts generally immediately surrounding power stations. It is then the general rule, briefly stated, that electricity is flowing to the water pipes from the rails in portions of the city remote from power stations, and is passing along the pipes toward the respective power stations, and at points mainly located within districts near to power stations. The electricity which has been gathered throughout the more distant territory and brought so far on its way to the power stations is flowing from the pipes through the earth to the rails and other short return paths to the generators. I regard it as important to give this now common proposition special prominence and emphasis, because so far as it is applicable to the conditions it both underlies and indicates the means which are serviceable against damage by the trolley-earth currents. An inspection of the map will give a comprehensive view showing the demarcation of districts in accordance with this proposition. The figures upon the map which are printed in black indicate a difference of potential tending to cause a movement of current toward the water pipes. The red figures indicate an outward pressure tending to cause the electricity which is upon the pipes to flow off into and through the earth to some conductor leading more directly to the power station. But while it will be observed that the principle groups of red or danger figures are generally in districts near to power stations, the situation in this city is one of peculiar complexity, the result of which is illustrated by some exceptional displacements of red groups into districts not in the vicinity of a power station, as also by a scattering of isolated red figures in different parts of the city.

Chief among these peculiar and complicating conditions is the operation of four principal and independent trolley railroads, with seven power stations in irregular and scattered positions and with intricately crossing and interlacing lines of track. Lack of any common standard as to system of feeders, supplementary wires and returns adds to the confusion. The extensive water front of Brooklyn and the situation of two large power stations directly on the shore and of two other power stations on Gowanus Canal, all with negative places of considerable capacity sunk in the water, together with the discharge of a heavy burden of current from the cars into the central peninsular between Wallabout and Gowanus constitute an important special feature in the distribution of the earth currents. From this latter combination of circumstances there appears to be an almost continuous line of dangerous potentials upon the water pipes along the shore from the navy yard to the Erie Basin. These dangerous potentials are indicated on the map by red figures upon arrows pointing outwardly from the shore. The conditions about Gowanus Canal also are seriously compromising to the safety of water pipes in that neighborhood, but the intricacies of the problem due to the relative situation of two power stations on the canal and three independent lines of road interlacing with each other in the immediate vicinity would require more time than could be allotted to it in order to locate and determine the extent of probable damage and to indicate what would better be done to diminish or remove the trouble. It will be seen on the map that the red or danger figures which might be expected to appear on Smith and Ninth streets, near power station F. are transferred from the street to the hydrants along the borders of the canal. The exact causes of so complete a transfer were not ascertained, but such tests as could be made indicated that it is in part due to a negative connection from the generators to a driven well near the canal, together with overloaded return wires from the rail system. On account of the limitation of time and expense under which the work was carried on, making it necessary to discriminate against the undertaking much of which is obviously desirable to be done, it was determined that after securing data for the map and so obtaining a general view of the situation, we should devote the remaining time to applying certain corrective methods with the object of demonstrating if possible that the damaging conditions could readily and materially be improved. From among the danger districts defined upon the map by the groups of red figures within which the corrosion of the water pipes is being actively promoted by the trolley currents, I selected that lying along Second and Third avenues, from Twenty-fifth street to Sixtieth street, for such special work as we were authorized to undertake. The outlying situation of this district and its power station at Fifty-second street with regard to other power stations and crossing roads make the conditions here affecting earth currents comparatively simple. In respect to actual damage to water pipes in this district the figures deduced from the measurements and represented upon the map are sufficient to show that electrolytic corrosion to a serious extent is going on. I am informed that numerous instances of destruction to service pipes have been reported. I have not personally investigated any of these cases. One excavation was made under my observation at the corner of Third avenue and Fortieth street, exposing a portion of the water main and branch at the junction of these streets, but upon a close examination no corrosion was discovered which could be attributed to the effect of trolley currents. At the same time there exists from the mains to the earth and rails a sufficient pressure to cause a destructive flow of electricity at any place where the moisture in the soil, or other favorable conditions, has established a suitable path for the current. It seems probable that the long service pipes which run across the street at short intervals and in comparatively close proximity to the rails are more liable to local damage than the mains, and that they would draw off upon themselves some proportion of the trouble, which would otherwise appear upon the mains. Still, I am of the opinion that more extensive excavations would discover abundant evidences of serious electrolytic corrosion upon portions of the mains. Regarding the question of corrosive measures, a leading purpose in this report has been to demonstrate with special clearness and emphasis that there are two things to be done which will materially diminish, if not altogether remove, the disastrous action of trolley currents circulating, according to the general rule, which has previously been described. The first thing to be done is, so far as practicable, to keep the railroad electricity off the pipes in all those regions where there is a tendency of the current to overflow from the rails to the pipes. The one method by which this overflow may effectually be diminished is to provide a more liberal system of return conductors than at present prevails, at least, on some portions of the Brooklyn railroads. The limit to which the perfection of the return system should be pushed ought to be fixed only by considerations of reasonable cost. After everything that is reasonable has been done in this direction there will still be a large overflow of current from the rails, which will be collected by the pipes and will be conveyed along the pipes to points where the conditions favor its discharge again into the earth.

The second thing to be done is to locate by careful investigation the points where this large and unavoidable residue of earth current tends to leave the pipes, and, by a system of special return wires directly connected at brief intervals to the pipe mains, to draw off as much as possible of the accumulated electricity harmlessly from the pipes, and thus to obviate the electroylitic action which is sure to accompany the passage of the current directly from the surfaces of the pipes into the earth. These two methods of treatment have frequently been proposed. It is important to associate the two steps in their proper relations with each other. In general the attachment of the lead wires to the pipes in the danger districts should not be undertaken until an adequate system of outlying returns has been provided by the railroad companies. After all that is practicable has been done to convey back the railroad current to the power stations by proper return conductors then the pipes in the vicinity of power stations may be relieved of the unavoidable overflow by lead wires correctly applied. Under these conditions the railroad companies will be prevented from relying upon the underground pipes, particularly the water-pipes, as a material and proper part of their return systems, and the pipes, so far as regards the principal circulation of trolley currents, would virtually be safe. The exceptional location of danger spots due to the causes which have been mentioned and to other more obscure causes, and especially to the relations between gas and water-pipes, will remain to be hunted out and a remedy applied to each specific instance. Such an investigation would include a study of the relations between the systems of independent railroads and the effect of earth plates. The remedies, after adequate and properly related systems of returns had been provided, would consist chiefly in electrically uniting different lines of pipes at suitable points, in establishing metallic connections between pipes and rails at places indicated by the conditions, and in general in drawing the electrical charge off from the pipes by the direct attachment of negative feed wires wherever a dangerous accumulation is found. Returning to the case of lower Third avenue, we could not expect to interfere with the general system of returns in use by the company owning this line, but I found the conditions much more complete and satisfactory for our purpose than was expected, and the officials and engineers of the road ready to aid the work as fully as could be desired.

A negative feed wire, containing 500,000 C. M. of copper, was run by the railroad company up Third avenue, from the power station on Fifty-second street as far as Twentieth street. From this feeder connections were made to the hydrant service pipes near Twenty-fourth street, Twenty-sixth street, Twenty-eighth street and Thirty-second street, with the general result of changing the electrical condition of the mains from dangerous to safe as far down as Thirty-third street, excepting an intermediate spot near Thirtieth street, which would be corrected by a connection made at this point. A similar connection was made at a hydrant between Forty-fourth street and Forty-fifth street. The protective influence of this isolated attachment does not appear to extend beyond a block in either direction. At this time it was discovered that there is a considerable flow of current from Fifth avenue down the pipes in the cross streets to Third avenue. This probably arises from some interchange of current between the Third avenue line and the roads operating on the park slope. It was decided that this inflow of current would best be met by making the future connections to the pipes at the junction of the cross streets with the avenue, and one such connection was made at Thirty-fourth street and Third avenue with favorable results. I do not insert here a detail of the figures obtained by tests of these changes because there is a confusing variation due to the varying loads and the different times of day at which the tests were made and we could not delay to reduce them to a common standard for tabulation. It will be observed on the map that the danger figures vary up to a maximum of two volts. After the protective connections were made the difference of potential runs to about the same degree in the opposite direction. It had been hoped to cover the whole of the danger line on Third avenue, at least, but the work was necessarily left incomplete at this point. A full detailed record of every test which has been made in this survey is on file in your office. I desire to describe in particular the means which were employed for making the attachment to the water mains, since it has been questioned whether it were practicable to insure the permanence of such connections. A clamp was made for the purpose under the direction of Mr. M. G. Starrett, chief electrician of the Brooklyn City railroad. The collar is of wrought iron, in two parts, three-eighths of an inch thick and two inches broad. The two parts are drawn together by three-quarter-inch bolts, with two nuts to each bolt. The collar is previously turned out upon its inner face to one-fourth of an inch larger than the diameter of the pipe to which it is to be applied. Midway in one part is formed a lug into which is brased a No. 00 copper wire.

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* Report made to the Brooklyn Subway Commissioners.

In applying the connection the pipe is carefully brightened all around with a file. A strip of bright lead $\frac{5}{32}$ of an inch thick and 2½ inches broad is laid around the pipe and the collar is clamped down by the bolts until the lead gasket is mashed into the inequalities of the pipe. The lines of junction between the collar and lead and pipe are thickly painted over with P. & B. mixture; then completely taped over and again painted with P. & B. upon the tape; after which the whole is thoroughly packed with good cement. I do not regard the thoroughness of this method as excessive in view of the requirements of the case.

One element in this problem of earth currents which should be mentioned as of great importance is the relation between water and gas pipes. The independence and extent of the two systems of pipe undoubtedly produce situations where there is a strong localization of current through the earth from one to the other and where that pipe is being continuously corroded from which the current is flowing.

After the foregoing presentation of the matter and in view of the actual developments in this and other cities where single trolley roads are being operated, it is unnecessary to go to any length in asserting the gravity of the situation.

It will be sufficient to state summarily that under the present condition in Brooklyn it appears indisputable that earth currents from trolley roads are causing extensive electrolysis of water pipes and other pipes and conductors imbedded in the ground at an indeterminate, but serious, rate. It also appears that there are practicable means at command which are being neglected and which, if properly organized and applied, would largely abate, if not altogether arrest, the ongoing destruction.

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NO GENERAL ELECTRIC FLOATING DEBT.

The Board of Directors of the General Electric Company has adopted the following resolution :

"Various printed statements (favorable and unfavorable) regarding this company and its business have heretofore appeared, most of them reading in a manner calculated to give the impression that they are issued either with the sanction of this company or from information furnished by its officers or directors; and whereas,

"In point of fact, and almost without exception, such statements, if made, are unofficial, and while often having some foundation in fact, are so inexact as to be to a great extent misleading.

"Now, therefore, be it resolved that the Board of Directors desires to caution the public against assuming that any casual statements, whether favorable or unfavorable, emanate from sources competent to furnish information respecting this company.

"Resolved, further, That this board now state for the information of stockholders that the company is entirely free from floating debt. Since the date of the last annual report the company has purchased $1,127,000 of its debenture bonds, using for this purpose the proceeds of various accounts and assets which have been liquidated since the date of the said report."

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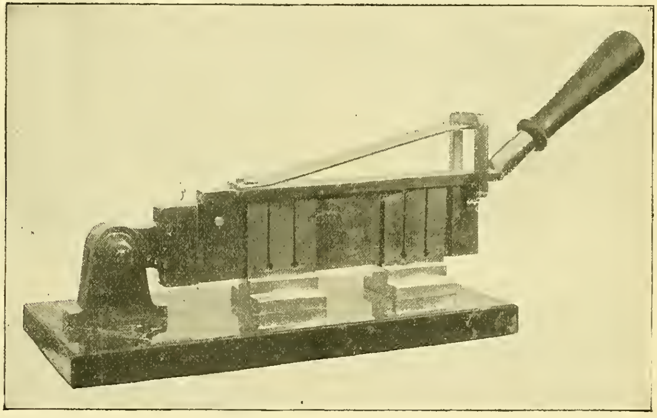
NEW QUICK-BREAK SWITCH.

The switch for high tension current and railroad work, illustrated herewith, was recently brought out by J. Grant High & Co., Philadelphia. In designing this device the inventor, George T. Evanson, had in view the object of making a switch with a quick break and one in which the contact between the blade and clips remains intact, until by lifting the handle all the resiliency in the spring is stored up, then the handle piece, coming in contact with the head of the yoke, gives a dead lift, releasing the hold the clips have on the blade, and causing the blade to spring out. In this way a quick and long break switch is effected. The handle piece, which is made of steel, is hinged in the back of the blade and extends through and snugly travels in the yoke, giving the additional strength to the blade and insuring it from damages arising from carelessness on the part of the operator. This application of the spring can be used either on single, double or triple pole. This style of switch is at the present time in use on the Roxborough & Incline Plane Railroad and the Pottstown & Ringing Rocks road.



QUICK-BREAK SWITCH.

J. Grant High & Co. are fitting with these switches several large railroad boards, now under way of construction in their shops.

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COMPETITION WITH STEAM LINES IN PHILADELPHIA SUBURBS.

It is stated that the Pennsylvania Railroad is feeling the competition of trolley lines to near-by suburban points to such an extent that the subject of reducing rates or withdrawing trains is being seriously considered. The electric lines to Germantown, Roxborough, Frankford, Media and intervening points, Darby and Chester, are drawing more and more from the steam roads by reason of their convenience, frequent trips and cheaper fare. In many cases the time is about the same. A large number of passengers who have to walk several squares to and from the railroad stations at both ends of their trip, find that the trolley cars carry them from home to destination in about the same time and at a lower rate of fare, says the Philadelphia *Public Ledger*.

The new time table of the Germantown and Chestnut Hill branch of the Pennsylvania Railroad gives an idea of the result of the competition of the trolley roads. There are now four trains less in each direction to Germantown and Chestnut Hill than there was last week and back to November. The Sunday time table shows a still greater change The trains are taken off in each direction, the reduction being from 22 to 12. A much larger proportion of the trains run without stopping to Queen Lane Station. Fewer trains stop at Ridge avenue and Germantown Junction.

Every train but one formerly stopped at Westmoreland. Now 12 trains from Broad Street statain and 6 from Germantown do not stop at Westmoreland.

The trolley cars are now carrying the bulk of the travel from the vicinity of the Forty-second street and Forty-ninth street stations of the Central Division of the Philadelphia, Wilmington & Baltimore Railroad, and the Delaware County and Philadelphia Electric Railroad is making inroads in the steam traffic from Angora, Fernwood, Clifton and Lansdowne, so that the next time table of the Philadelphia, Wilmington & Baltimore Railroad will, it is thought, show fewer suburban trains on the Central Division.

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STORAGE BATTERY ELECTRIC RAILWAY AND LIGHTING PLANT.*

BY G. HERBERT CONDICT.

The city of Merrill, with a population of about 9,000, is situated on the Wisconsin River in the lumber regions of Northern Central Wisconsin, 255 miles north of Milwaukee. The city is divided by the Prairie River (which here flows into the Wisconsin) into two parts, the east and west side. The Merrill Railway and Lighting Company operates the trolley road running between the two extremes of the city, a distance of 1¾ miles. The road was built for three cars with two turnouts, but only two cars are run ordinarily. The cars are run without a schedule, making the round trip in from 20 to 30 minutes, according to demands of travel.

Power is supplied from a water-wheel at the east side plant of the company, situated near the track, about one-half mile from east end. The water wheel is run without a governor, as that was found to be useless, owing to sudden variations of load. As can be readily understood, the running of cars under these conditions was not at all satisfactory.

The electric lighting of the city is divided between two stations, the east side one being run from the water-power plant before mentioned, situated at the center of the east side light distribution, and the west side from a steam plant. The east side equipment consists of two 25-KW. Edison dynamos, carrying a maximum of 1,000 lights on the 3-wire system; and a United States 500-volt machine for municipal lighting, carrying 150 lights, 5 lamps in series. The west side equipment comprises a 20-KW. Edison machine, carrying a maximum of about 400 lights on the 2-wire system, and a Weston 150-light, 500-volt machine, and a 30-light Thomson-Houston arc machine. There are no gas works in the town.

The storage battery plant recently installed is situated midway between east and west sides on the line of the trolley road, about ¾ mile from the east side power house and ¼ mile from center of the west side light distribution.

The plant consists of 240 chloride accumulators with a capacity of 500 ampere hours at a 50-ampere rate of discharge. The batteries are divided into four series of 60 cells each, connected to a switchboard and so arranged that cells may be connected to the railway, 240 in series, or to lighting circuits in two parallel series of 60 cells each, one on each side of the 3-wire system; they are thus capable of supplying nominally 400 16-C. P. lamps for 10 hours, or at the maximum rate of discharge, 600 lamps. An independent feeder connects the battery with the east side power-house three-quarters mile distant. A variable resistance is placed in circuit between the battery and the railway so that when the battery is fully charged, requiring a voltage of 600, the voltage on the railway circuit may be cut down if necessary.

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* Read before the Northwestern Electrical Association, Jan. 17, 1895.

The operation of the east side lighting and the night running of cars (or rather car) was most unsatisfactory before the battery plant was installed. Owing to lack of power, it was necessary to couple together railway and lighting water-wheels, so that the slightest variation in the railway demands was apparent in light. Only one car could be run during lighting hours.

That the dwellers in Merrill, east side, should consider electric lighting a failure under these conditions, and that the traveler in the slow, dimly lighted car sighed for the return of the ancient horse car, is not to be wondered at. On Jan. 4, 1895, the battery was connected to the railway circuit. The great improvement in the running of cars was immediately noted by all, but it was at night that the contrast was most apparent. The two water-wheels were connected together as usual, but the railway generator charged the battery at a steady rate of 20 amperes instead of running a car with its ever varying demand of from 0 to 120 amperes. Instead of one dimly-lighted, slow running car, two brilliantly lighted cars were operating at the highest speed allowable on the streets. Instead of a succession of sharp peaks the voltage "curve" of lighting circuit became practically a straight line; instead of nine volts variation on each side of three-wire system, as at first, there is practically no variations, demonstrating most clearly the capability of the battery to respond to all demands of railway, no matter how severe. On several occasions the two cars were operated by the battery alone for several hours at a stretch, thus allowing in the daytime the entire shutting down of the power plant and, at night, the use of the two water-wheels exclusively for lighting.

The company intends to increase its power at the east side plant by the addition of a wheel to operate the railway generator. By this addition the two wheels now in use may be utilized for east side lighting, while the battery carries the west side incandescent lighting. The battery will be charged during the day, as at present, from the railway generator, at the same time keeping voltage even on railway circuit. This plan will enable the company to do away entirely with the west side steam plant, there being surplus water power sufficient to run the arc and 500 volt incandescent machines now at the west side.

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OBSTRUCTION OF CARS IN WASHINGTON.

An undertaker in Washington was recently charged with seriously obstructing the cars of the lumbia Railroad Company. At the trial Judge mball read the section of law under which the osecution was brought, as follows:

"Street cars within the District of Columbia hall have the right of way upon their respective acks, and no person shall obstruct or delay the ovements thereof at a lawful rate of speed, here-nafter provided, except the authorized officials of the District of Columbia in the discharge of public duty, unless otherwise provided."

Commenting on the law, Judge Kimball said that ample provision is made for funerals, and there was no reason why they should interfere with the movements of street cars. Funerals crossing car tracks and street crossings had the right of way, and vehicles are not permitted to pass through them, but when funerals and street ars were going the same direction the cars have he right of way, and were not to be obstructed in ny manner, except as provided by law.

H street northeast being the only paved street in that section north of Maryland avenue, and being the direct route to several cemeteries, the funeral processions naturally go that way. This was explained to the court, and the street car representatives said that only a few days ago another funeral followed the track from Ninth street northwest to Fifteenth street east, and caused a serious delay to the cars.

The defendant demonstrated to the satisfaction of the Court that he had not been responsible for the obstruction of the cars in the particular case covered by the charge, as he did not have supervision of the carriages. The Court warned him of the dangers of the practice, and said that had he been shown to be responsible a fine would have been imposed.

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NEW ENGLAND NOTES.

(From Our Boston Correspondent.)

The Newton & Waltham Street Railway Company is petitioning for authority to extend its system, so as to include the entire cities of Newton, Waltham and Watertown.

Agents have been in Boston, Lynn and other Massachusetts towns, the past few days endeavoring to engage men to go to Brooklyn, there to take the place of the striking railroad hands. Very few hands could be induced to go.

Electric headlights have very generally superseded the poor, dim oil lamp on the street cars in Boston, while on certain suburban sections of the West End system the cars are now heated by electricity, to the advantage and comfort of passengers.

The Morris Cove Electric Railway Company, of New Haven, Conn., has secured an injunction against the New York, New Haven & Hartford Railway Company, restraining the latter from interfering with the former's employees while stringing electrical feed wires across the steam railroad tracks.

The West End Railroad Company, of Boston, carried 137,000,000 passengers last year, and about 11,000,000 transfers were issued. The company has found that the transfer system is so grossly abused that it has recently suggested a uniform 6-cent transfer check system to take the place of the free and 8-cent transfer check system now in operation.

The litigation between the Westville & Fairhaven Railroad Company and the Western Union Telegraph Company has been settled amicably, and the suit has been withdrawn. The Western Union Company will remove all the railway wires that are in proximity to the telegraph wires, with the operation of which, it was claimed, they interfered, but the railway company will bear the expense, and likewise the cost of the suit as far as it has gone.

A company has been organized for the purpose of building an electric street railway from Greenfield to Turner's Falls, via Cheapside and Montague City, Mass., at an estimated cost of $100,000. Stock to the amount of $50,000 and bonds for a like amount will be issued. A new bridge will be necessary over the Connecticut River at Montague City, which is estimated to cost about $13,000. Several wealthy capitalists, including H. T. Prince, of Leominster, Mass., are interested.

After all the earnest and repeated attempts to secure a pardon from the Governor for the five employees of the N. Y., N. H. & H. Railroad Company who were convicted of riot at North Abington last spring, the matter in dispute being the laying of a grade crossing by the local electric railway company, the prisoners are having to serve out their respective sentences in Plymouth jail. Three of the men have just been liberated after the expiration of their term, while the superintendent of the road and one of the foremen, who were the instigators of the trouble, have yet to remain two months. Their sentence was for five months; those who have been liberated were incarcerated for three months.

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CANADIAN NOTES.

(From our Special Ottawa Correspondent.)

Kingston, Ont.—Application is being made to the legislature by a company for power to contruct an electric railway between Kingston and Gananogue.

Montreal, Que.—There is a prospect of the Montreal Street Railway Company building a belt line along Ontario and Burnside streets to University street.

Hamilton, Ont.—The Hamilton Iron and Steel Company has applied to the legislature for power to construct a tramway to be operated by steam or electricity in connection with its works.

Brantford, Ont.—The Brantford, Port Dover and Galt Radial Electric Railway is applying for power to construct lines of railway from Brantford to Paris, Galt, Oakland, Townsend, Simcoe and Port Dover.

Waterloo, Ont.—Application is made to the Legislature to incorporate the Grand Valley Railway Company, which will operate by steam or electricity a road to run from the town of Berlin to Brantford, Listowell, Stratford and Elora.

Toronto, Ont.—The annual report of the street railway company shows gross earnings, $958,370; operating expenses, 54 per cent.; net income, $250,655, or 4 per cent. on capital of $6,000,000.

The municipal council of the town of North Toronto is applying for power to purchase the Metropolitan Street Railway Company with a view to improving the service.

London, Ont.—The London Radial Electric Railway Company in applying to the legislature for power to construct an electric railway from London to Lucan or Granton; to Parkhill or Ailsa Craig; and from London to Deleware, Belmont and Harrietsville. Application for the charter is made by J. Bland, J. S. Pearce, D. M. Cameron, C. H. Elliott, S. Sterling, C. W. Leonard, W. J. Reid and E. R. Cameron.

H. A. Everett, E. W. Moore, T. H. Smallman, S. R. Break and Chas. Ivey are applying to the legislature for a charter incorporating the London & Western Ontario Electric Railway company with a capital of $1,000,000 for the purpose of constructing electric railways from London to St. Thomas and thence to Aylmer and Port Stanley; also from London to Dorchester, Ingersoll, Woodstock and Tilsonburg; also from London to Deleware, Glencoe, Lucan, St. Mary's and Stratford.

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FINANCIAL NOTES.

La Roche Electric Works Assignment.—J. Frank Stevens is the assignee of the La Roche Electric Works, of Philadelphia, which made an assignment last week.

New Receiver in Lincoln, Neb.—Brad D. Slaughter has been appointed receiver of the Lincoln Street Railway Company in place of President Little, who was originally appointed by the court.

Dundee Rapid Transit Company's Creditors.—Creditors of the Dundee Rapid Transit Company, of Elgin, Ill., held a meeting recently in Chicago to consider a proposition to settle for 60 cents on the dollar. The matter will be submitted to creditors not present at the meeting.

Delaware Valley Road in Receivers' Hands.—M. F. Coolbaugh and E. N. Peters have been appointed receivers of the Delaware Valley Electric Railway, which is being built by Philadelphians from Stroudsburg, Pa., to Bushkill. The company stopped operations a few weeks ago.

New Philadelphia Traction Stock.—The directors of the Philadelphia Traction Company last week passed a resolution recommending that the stockholders issue $5,000,000 new stock. The proceeds will be used for paying off the floating debt, and will cover the work now in progress and that contemplated.

The Glens Falls, Sandy Hill & Fort Edward Street Railroad Company gives these figures in its report for the quarter ending Dec. 31: Gross earnings, $11,741.06; operating expenses, $8,638.17; net earnings, $3,102.80. The company's net earnings for the corresponding period of last year were less than $10.

Legislation Recommended in New Hampshire.—The Railroad Commission of New Hampshire in a report to the legislature on street railways contains this recommendation: "We should recommend the passage of a general law broad enough to make it unnecessary and unwise for the legislature to grant a special charter in any case."

Suggestion for Taxing Street Railways.—The Chamber of Commerce of New Haven in a report suggests that the City Court of Common Council petition the legislature for an amendment of the present state law relating to the taxation of street railways, so that such companies shall pay a tax of 3½% on gross earnings to the cities or towns in which their tracks are laid, the proposed tax to be in lieu of all other taxation.

Adrian (Mich.) Street Railway Litigation.—The city attorney last summer filed a bill in the Circuit Court setting forth the failure of the Electric Street Railway Company to operate its road according to the terms of the franchise and praying for an order compelling the company to either operate the road or forfeit the franchise. The attorney for the company filed a demurrer, and the preliminary hearing was had last week. Judge Lane rendered his opinion sustaining the demurrer, and the case goes out of court. The decision hinged on the question whether or not the city sought the proper remedy. No evidence was taken as to the fact.

Rumor Denied in Boston.—The *Boston News Bureau* quotes an official of the West End Street Railway Co. as saying: "I don't believe there is a word of truth in the report that New York parties are buying West End for control; the stock is too widely scattered and too largely held for investment. September 30th, 1894, there were 114,168 shares of preferred stock and 163,383 shares of common stock held in Massachusetts by about

6,000 shareholders; and outside of Massachusetts there are only 42,149 shares of stock, both common and preferred, held. New York holds 10,873 shares and there are scattered over 29 States 20,115 shares, and 1,261 shares are held abroad. It can be seen from this that to get control of West End St. Ry. Co. would be a pretty difficult undertaking."

Purchase of the Second Avenue Road, New York.—It is announced that the Second Avenue Surface Railroad of New York has been purchased by a syndicate consisting of Messrs. J. and W. Seligman & Co., Emerson, McMillan & Co. and Clark, Ward & Co. It is reported that the new owners propose to introduce the cable system, and this will be done with the proceeds of the $2,000,000 second mortgage bonds. The first mortgage bonds, except those held to retire existing liens and for working capital, have virtually been sold at par, with a bonus of 40 per cent. in the stock. Work on the cable, it is announced, will be begun immediately. The line runs from the Harlem River to Peck Slip, and will have important transfer and crosstown connections, but will not be extended. The capitalization of the new company will be about $7,500,000 five per cent. first mortgage, $2,000,000 five per cent. second mortgage and $6,500,000 stock.

Consolidation at Allentown, Pa.—The Allentown & Lehigh Valley Traction Company and the Allentown & Bethlehem Rapid Transit Company were formally consolidated Jan. 17, when the annual meeting of the two corporations, with the underlying companies, was held in Allentown. The plan of consolidation was satisfactory to the minority stockholders of the Allentown & Bethlehem Rapid Transit Company. The plan is to pay off the $500,000 mortgage on the transit road, and $750,000 on the traction road, as well as the floating debt of both companies, take up the stock of the minority shareholders of the Transit company, and cover the entire system with a mortgage for $2,000,000, for which new bonds will be issued. During the meeting a mortgage for $2,000,000 was executed and signed by the officers of the Traction and Transit companies and underlying companies. It is to cover all the real estate and roadbed of the companies. The Traction company now controls thirty miles of road, and has large extensions in view.

Hestonville (Philadelphia) Earnings.—The annual report of the Hestonville, Mantua and Fairmount Passenger Railway Company of Philadelphia shows that last year's total receipts were $286,021.32, as follows: From passengers, $278,343.71; from advertising in cars, $4,137.56; from miscellaneous sources, $3,540.08. The operating and general expenses, including salaries, city and State taxes, etc., were $240,671.71, thus leaving a net profit of $45,349.61. As compared with the previous year, receipts decreased $26,472.21. The total number of passengers carried was 5,748,918, or 797,475 less than in 1893. Referring to these losses, the report states that they were largely due to the depression of general business and to the fact that since the 15th of April up to the latter part of November of the past year, the company was engaged in the reconstruction of the system from horse to electric. The board during the past year discharged all obligations of the company, so that on the 31st day of December the books closed without a dollar of indebtedness.

The company declared a semi-annual dividend of 3 per cent. on the preferred stock.

Alleged Attempt to Buy the Chicago City Railway.—The *Economist* of Chicago is authority for the statement that an offer in excess of current quotations has been made to the holders of Chicago City Railway shares. It was alleged that the deal was proposed by brokers identified with the Yerkes interests. It is estimated that control of the South side surface lines could not be secured for a less sum than $13,500,000. The present quotation of stock is $300 a share. This is the figure said to have been offered and refused. The stock capitalization of the road at present is $9,000,000, which at the above rate reaches $27,000,000. President George H. Wheeler, of the Chicago City Railway, talked of the rumor as a good joke. Mr. Yerkes denied the report point blank. "I have not made any bid for the South Side road," said he, "and instead of wanting to monopolize the surface and elevated railroads of Chicago, I want to say I have as much business on my hands now as I want. The story is made out of whole cloth so far as I am concerned." One of the biggest capitalists of the city, who is behind Mr. Yerkes in every move that he makes is quoted as authority for the statement that the effort to secure the control of the South Side lines has by no means been abandoned.

Consolidation Talk in Kansas City.—A general consolidation of all, or nearly all, of the street railway properties in Kansas City in the early future is not only possible but probable. For nearly three years it has been often said among those who have charge of the managements of the Kansas City street railways that a general consolidation of all the properties is the ultimate solution of the street railway problem. The talk of consolidation and efforts to accomplish a consolidation are hastened just at this time by the difficulties that have been growing up in West Kansas. The Metropolitan Street Railway Company has held control for more than six months of everything west of the Union depot. As long as there is a disagreement between the companies there is but one way for the Kansas City Cable Railway Company to reach Kansas City, Kan., and the stock yards, and that is by building expensive extensions, which would cost not much short of three-quarters of a million dollars. This would draw business away from the other company, which would greatly injure the latter. While the two big companies have been fighting proposals have passed between the stockholders and it is stated that not long ago stipulations were drawn, though they have not been signed.—*Kansas City Star*.

NEW INCORPORATIONS.

Beaver, Pa.—The Economy Street Railway Company has been incorporated with a capital stock of $30,000. The promoters are Hartford P. Brown, Henry M. Camp, Rochester, Pa., Chas. H. Bentel, Freedom, Pa.

Portland, Me.—The Portland Electric Railway Company has been incorporated. The incorporators are Jacob S. Winslow, Stephen R. Small, Albert D. Boyd and S. C. Boyd and others. The capital stock is not to exceed $500,000.

Pittsburgh, Pa.—The Dravosburg & Elizabeth Electric Street Railway Company has been incorporated. The capital stock is $40,000. The promoters are: H. W. Jurgen, Pittsburgh, Pa.; Jno. Shrader, McKeesport, Pa.; J. R. McQuaide, Duquesne, Pa.

Lakeside, Mich.—Mt. Clemens & Lakeside Electric Street Railway and Dock Company has been incorporated with a capital stock of $25,000. The promoters are B. B. Conisin, Mt. Clements, Mich; Evan Jones, George L. Fischer, W. C. Gunderfinger, Pittsburg, Pa.

Oberlin, O.—The Elyria, Oberlin & Wellington Electric Railroad Company has been incorporated with a capital stock of $100,000. The incorporators are A. R. Webber, W. A. Braman, R. A. Reefy, W. B. Bedortha, Charles A. Metcalf, J. W. Stule, J. H. Johnson, Parks Foster, Wm. Heldmyer and J. B. Thompson.

Chicago, Ill.—The King Solomon Mining and Power Company has been incorporated with a capital stock of $1,000,000, to develope and locate mining property, furnish light, heat and power, electric or otherwise, construct railways, tramways, etc. The promoters are: Jno. Cassleman, Arthur B. Lewis, Harry C. Igel.

Centralia, Kan.—The Centralia, Seneca & Pawnee Electric Railway Company has been chartered to establish, equip and maintain an electric motor railway between the cities of Centralia and Seneca, in the State of Kansas. The capital stock is $200,000. The directors are as follows: A. W. Slater, J. C. Clark, S. W. Burtch, A. L. Coleman, John S. Hidden, F. A. Stickel and W. S. Domer, of Centralia; R. M. Emery and A. Wells, of Seneca.

NEWS OF THE WEEK.

Detroit, Mich.—It is stated by Strathearn Hendrie that, as he has secured a franchise through Royal Oak township, a road to Birmingham will be built in the spring.

Atlantic City, N. J.—The Brigantine Transit Company contemplates making extensive improvements before the summer season opens. The electric railroad will be double-tracked its entire length of seven miles. An addition will be made to the company's power-house at Brigantine.

Anderson, Ind.—C. L. Henry has secured a franchise for an electric street railway through Summitville. He has secured similar privileges at Fortville, Pendleton and Alexandria. These franchises are for the Gas Belt Electric Railway from Indianapolis to Marion, a distance of 80 miles. The Henry company now has practically all of the right of way.

Ilion, N. Y.—It is probable that the three horse car lines running from Herkimer to Frankfort will be consolidated and converted into electric lines the present year. Messrs. Beckwith and Quackenbush hold a controlling interest in the Herkimer road, and have secured an option on the other two roads. It is said they are securing the properties for persons who do not live in the immediate vicinity.

New York, N. Y.—The Broadway cable cars going south were blocked for 20 minutes a few days ago at Liberty street by an unusual obstruction. A horse shoe that had been cast in the slot of the cable became twisted about in the upper part of the grip of car 153 and brought the car to a stop with a jerk. It required hard work on the part of several men to free the grip of the encumbrance.

Boston, Mass.—Representative Gallivan of South Boston has introduced a bill in the House to-day requiring all street cars to be heated to a temperature of not less than 60 degrees during the months of November, December, January, February and March of each year. The penalty for not doing so is fixed at $25 for each trip of a car not heated The district police are to enforce the law.

Philadelphia, Pa.—District Attorney Ingham has filed a petition asking for the condemnation of another strip of land belonging to the Gettysburg Electric Railway Company, which is wanted to preserve the Gettysburg battlefield. Judge Dallas fixed the 28th inst. as the date on which cause should be shown why a jury of seven should not be appointed to assess the damages for the land in question.

Baltimore, Md.—Thomas C. Basshor & Co. have received the contract for the steam piping to equip the power-house for the Belt Line tunnel. The work must be done prior to April 1, when it is expected the line will be ready for the electric locomotives to be used in the tunnel. D. E. Evans & Co. have the contract for lighting the tunnel electrically, the current to be furnished from the source supplying the motive power for the trains.

Media, Ill.—The Delaware County Electric Railway Co. has completed another section of the road. Cars are running as far as Vernon street, in East Media, where passengers can change and take the cars of the Media & Chester line and reach the borough proper. The construction of the line along Washington street through Media will be begun in the spring. The ordinance giving the company the right of way along Washington street provides that the street be paved with vitrified brick.

Trenton, N. J.—Montgomery township and Rocky Hill borough have granted franchises to the New York and Philadelphia Traction Company for the electric road. Princeton borough now alone blocks the way for a through route between New York and Philadelphia. It is expected that the opposition manifested in Princeton, which is confined principally to the college faculty, will be withdrawn before the company is ready to begin construction.

Kansas City, Mo.—James A. Williamson, formerly a conductor employed by the Metropolitan Street Railway, who was arrested last December on a charge of embezzling money by means of a "brother-in-law," has brought suit to recover $1,950 damages against the company. In his petition he states that he was imprisoned 11 days in the jail before the charges against him were dismissed by the Criminal Court, and that the decisions showed that he was prosecuted without reasonable cause.

Port Jervis, N. Y.—The building of an electric railway in Port Jervis has assumed such shape that it is safe to predict its operation before the coming summer is over. At a recent meeting of the Port Jervis & Suburban Street Railway Company the property was turned over to the new owners. A new board of directors was elected as follows: P. J. Horan, T. B. Howe and H. H. Archer, of Scranton, Pa.; Stephen A. D. Whittaker, of New York City; and Benj. Ryall, C. E. Cuddeback and W. H. Nearpass, of Port Jervis.

Philadelphia, Pa.—A syndicate which is said to represent the People's Traction Company has purchased from David McMahon, of Germantown, a tract of 15 to 20 acres of ground at Flourtown, cn the Bethlehem turnpike. It is probable that a power station and car barn will be constructed on the site for the proposed extension of the People's Traction Company on the Bethlehem pike from Chestnut Hill. The power station will eventually also furnish power for the Chestnut Hill extension of the Germantown line of the People's system.

New York, N. Y.—Plans have been maturing for some time between the Third Avenue Cable Company and the Union Railway Company, which operates the trolley, looking to an agreement of this sort, which will probably go into effect in a few weeks. It is proposed to attach "trailers" to the cable and trolley cars, which will be transferred to the lines when the terminus of the road upon which they are traveling is reached. On the uptown trips two trailers will be attached to the cars, one of which will be transferred to the Washington Heights line at 125th street.

Fort Wayne, Ind.—The union men employed by the Fort Wayne Street Railroad Company went out on strike Jan. 11. No inconvenience was experienced in starting the cars and manning the snow plows, as there were enough extras and regulars, not members of the union, to operate the lines. Affidavits were filed in the Circuit Court last week by the prosecuting attorney for the arrest of five directors of the Fort Wayne Electric Railway Company, for discharging R. J. Hollandsworth, one of the motormen, for being a member of a labor organization. A similar affidavit was filed against Loren McNutt, superintendent of the road, for discharging Cyrus J. Ward, a conductor. The suits are based on a State law which forbids corporations from discharging employees because of their connection with labor organizations. The suit is one of the results of a strike.

PESONALS.

Mr. Rudolph Eickemeyer, the inventor, died in Washington last Wednesday night.

Mr. William P. Searls, president and general manager of the North End Street Railway Company, of Worcester, Mass.. since its organization in 1891, has withdrawn from the management of the company's affairs. Mr. Searls' retirement is due to the fact that his work in the legislature consumes a vast deal of his time.

Mr. Alexander H. Bauer, chief electrician of Pullman's Palace Car Company, Chicago, died in New York City on Jan. 15 of Bright's disease at the age of 46. Mr. Bauer had an extensive experience as an electrician. He was a telegraph operator until 1882, when he chose a broader field. He was identified with the storage battery traction experiments that were made in Baltimore. Mr. Bauer had been connected with the Pullman Company since 1887.

TRADE NOTES.

The Consolidated Electric Manufacturing Company, of Boston, is doing an excellent business nowadays with street railway companies all over the country, which are sending in many excellent orders for the well known efficient "Lyon" brake handle, as well as for G. E. M. switches for power station work. These devices are now in use on the principal roads in the country.

The Pennsylvania Railroad offers superior facilities for carrying delegates to the Convention of the National Electric Light Association which meets at Cleveland on Feb. 19, from all points along its lines and tributaries, at the special rate of one and one-third fare for the round trip. The train for this service leaves New York at 6 P. M., carries a dining car, and reaches Cleveland the next morning at 11:15.

Hartford Railway Power Station.—The new power house of the Hartford Street Railway Company is now completed and is said to be one of the finest, if not the finest, in the New England States. It is 66 feet wide and 230 feet long, entirely fireproof, no woodwork at all having been used about the building. It was designed and built by the Berlin Iron Bridge Company, of East Berlin, Conn., and is covered with that company's patent anti-condensation corrugated iron roofing.

The Composite Brake Shoe Company, of Boston, has just licensed the King & Andrews Company, Chicago, to manufacture and sell its brake shoes in the States of Indiana, Illinois and Wisconsin. For the present the Composite Company does not limit the licences to those States, but permits them to sell in other territories west and south of these States. The Composite Brake Shoe Company has been manufacturing these shoes at Boston, Philadelphia and Pittsburgh, for some time, for sections east of Chicago, and now finds it necessary to make such provisions still further west.

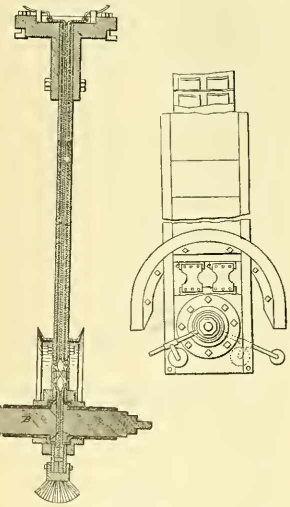
The Work of Nikola Tesla.—"The Inventions, Researches and Writings of Nikola Tesla," by Thomas Commerford Martin, published by *The Electrical Engineer*, New York, has met with remarkable success. The first edition appeared during January, 1894, and the second was completely exhausted before the close of the year, several orders now being in hand for the third, which is expected early in January, 1895. The welcome accorded to the work abroad has also been most cordial. It has been favorably reviewed by the technical press of England, Germany, France, Russia, Italy and other countries, and an authorized German translation is now being brought out by W. Knapp, of Halle. The book embraces all Mr. Tesla's inventions and researches made known up to date, and includes his oscillator, or new electrical generator, which he is rapidly bringing to a high pitch of efficiency and economy. The more important parts of the book have had the benefit of Mr. Tesla's personal revision.

Medbery Insulation.—The Medbery insulation has taken a leading position in the market for street railway and overhead trolley equipment, and it is unquestionably a most profitable material for permanent railway construction. Its popularity is attested by the large sales which are already being made for future delivery. This company is prepared to furnish anything in the line of overhead material in the best aluminum bronze, and is also making some drop forged carbon steel specialties, among them being a drop forged steel trolley harp and self-oiling aluminum bronze wheel, which are very low in price, and very strong and durable. The company also offers a new model of sleet cutting trolley wheel. Its overhead frog and switches enable cars to cross them at full speed without danger of the trolley jumping off, and yet are offered as low in price as ordinary goods. It is also making a superior quality of wall socket for electric lamps and special lamp socket for use in mines, factories and other places where water, acid and gas-proof qualities are valuable. It is also making a full line of insulating joints for chandelier and bracket work which are cheap and excellent. The company has recently increased its facilities very largely.

RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued Jan. 15, 1895.

532,448. Conduit Railway Trolley; William T. Dulany, Jr., New York, Assignor of one-half to Oscar F. Shaw, Brooklyn, N. Y. Filed March 30, 1894. The underground trolley standard has two plate conductors, insulating material separating and inclosing the conductors. There are front and rear bars, side plates and wearing plates, secured to the bars, and a head block, secured to the upper end of the standard, each conductor consists of two plates placed end to end, but apart from each other, a fuse cut-off uniting the plates on a lower level than the wearing plates, a cut-off is connected with the upper end of each top conductor plate.



No. 532,449.

532,449. Conduit Electric Railway; William T. Dulany, Jr., New York, Assignor of one-half to Oscar F. Shaw, Brooklyn, N. Y. Filed Aug. 16, 1894. The underground trolley standard has two sets of plate conductors, each set being separated from the other by insulating material and inclosed in insulating material. There are front and rear bars, side plates and wearing plates secured to the bars and inclosing the insulated sets of plate conductors, each set consisting of three plates, viz , two upper plates united to the end of a lower plate by a fuse cut-off, (See illustration.)

532,475. Brake for Electric Motors; William H. Morgan, Alliance, O. Assignor of three-fourths to Thomas R. Morgan, Sr., Thomas R. Morgan, Jr., and John R. Morgan, same place. Filed March 19, 1894. A friction device is connected to the short arm of a pivoted lever, and an armature is carried by the long arm of the lever. The said armature is adapted to rest in close proximity to the field or the motor and be attracted thereto when the field is energized to effect a release of the brake.

532,477. Trolley Catcher; Martin V. B, Nichols and James A. Fraser, Port Arthur, Can. Filed May 26, 1894. A pendent pole pivotally connected to the outer end of the trolley arm, and the guide or box is adapted to be secured to the dashboard A weight is held to slide vertically on the box, having a handle member, and a spring catch adapted to engage such member when the weight is elevated. A flexible connection is secured to the weight and to the lower end of the pole, a bell crank lever is connected to the catch at one end, and a connection is made between the lever and the pole.

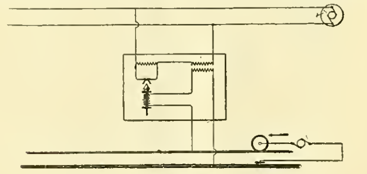
532,537. Automatic Circuit Breaker; Harry P. Davis, Pittsburgh, Pa., Assignor to the Westinghouse Electric and Manufacturing Company, same place. Filed Feb. 28, 1894. There is a magnetic casing in the circuit to be broken, and a pendent shunting armature hanging near to but insulated from said casing, and an adjustable stop is adapted to make contact with the pendent armature.

532,538. Controller for Electric Cars; Harry P. Davis, Pittsburgh, Pa., Assignor to the Westinghouse Electric and Manufacturing Company, same place. Filed April 14, 1894. The switch handle is removable only when in a certain position relative to the switch, and means are provided for preventing this position of handle and switch, save when the switch is in one predetermined position.

532,566. Car Fender. Joseph J. de Kinder, Philadelphia, Pa. Filed Nov. 27, 1893. Brackets are secured to the car, to which fender bars are pivoted at an intermediate point. There is a spring seat above and a spring seat below each of the bars and secured to the car to support the rear end of the bars, and a supporting connection between the bars is arranged.

532,576. Closed-Conduit Electric Railway. George W. McClintock, Wollaston and Daniel J. McLane, Quincy, Mass. Filed July 2, 1894. The system has an exposed sectional conductor rail with insulation between its sections and each section provided with depending contact pieces. A feeder has branches for connection with the pendent contact pieces of the conductor rail, respectively, and the trolley rail is composed of depressible spring-supported sections corresponding with the sections of the conductor rail. Switch levers centrally pivoted to bearings intermediate of the conductor rail and trolley rail extend under the latter on one side of their pivots and carry contact plates on the opposite side for connecting the branches of the feeder with the contacts on the conductor rail by vertical movement when the trolley rail is depressed. (See illustration.)

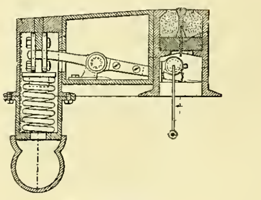
532,590. Closed-Conduit Electric Railway; John Schnepf, New York, N. Y., Assignor of one-half to William H. Bellamy and William C. Doscher, same placed. Filed Sept. 9, 1893. The conduit is a slotted conduit, and adjacent thereto is a conduit containing a continuous, flexible and movable main conductor, the metallic plates over the latter conduit are insulated from each other longitudinally, and also insulated from the surface of the street by superposed non-conducting material and which project into the slotted conduit. A trolley engages with the plates and a magnet and a motor on the car, whereby the magnet may draw the main conductor into direct contact with said metallic plates.



No. 532,593.

532,593. Converter System for Electric Railways; Charles F. Scott, Pittsburg, Pa.. Assignor to the Westinghouse Electric and Manufacturing Company, same place. Filed July 31. 1893. The patent relates to an alternating current feeding circuit, a working converter fed thereby, a choke coil in series with the primary thereof, and a normally open short circuit around that choke coil, a bridge for closing the short circuit and electrical means for operating the bridge in series with one of the coils of the working converter. The choking coils are so proportioned as to be unsaturated when the secondary is open and saturated when it is closed under normal conditions. (See illustration.)

532,610. Car Fender; Edward K. Thoden, Brooklyn, N. Y. Filed May 23, 1894. The fender, comprising a removable hanger frame that is curved outwardly on the forward edge and a downwardly spring pressed catcher frame. Means to detachably secure the catcher frame elevated on a car front are provided, and there is an upwardly spring pressed and partly flexible folding guard rim over the curved margin catcher frame. A device is arranged to retain the guard rim folded and release it when actuated by weight imposed on the catcher frame.



No. 532,576.

532,621. Brake for Railway Cars; David L. Winters, Pueblo, Colo. Filed May 19, 1894. There are flexible connections between the drum and brake-rod. An annular friction-plate is removably secured to and carried by a wheel, clutch arms being secured to the drum and provided with clutch-shoes to engage the friction-plate. Means for operating the clutch-arms to bring their shoes into frictional contact with said friction plate are provided.

532,670. Brake Handle; Frank N. Kelsey, New Haven, Conn., Assignor of one-third to Charles L. Wright, same place. Filed Aug. 29, 1894. This is the combination in a ratchet brake, with the brake rod or shaft and a brake handle having a socket at its lower end, of a toothed clutch member secured to the rod or shaft, a similar clutch member located in the socket in the handle, and capable of a limited endwise movement therein. There are intermediate connections between the handle and the latter clutch member, whereby an initial backward movement of the former will raise the latter entirely out of the engagement with the opposite clutch member.

532,683. Car Fender; Andrew Mohn and August J. Bothur, Hoboken, N. J. Filed Aug. 30, 1894. The fender consists of a shaft with a revoluble brush having a central hub mounted on the shaft and provided with a central recess in its side. A spring is arranged in said recess with one end connected to the shaft, and the other end connected to the hub, means for moving the brush longitudinally on the shaft being provided.

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Brooklyn Bridge Car Lighting.

The American traveling public demands all possible luxuries and conveniences. No matter how short the journey may be the most modern equipment must be provided or those responsible for withholding it will be overcome by complaints. A system of electric lighting, described elsewhere in this issue, will therefore be introduced in the coaches of the New York and Brooklyn Bridge Railway during the present month. The trip from terminal to terminal occupies only six minutes, but the reading of daily papers cannot be interrupted even for that length of time without arousing the bitterest complaints of inferior lights.

New York Rapid Transit.

Rapid Transit does not make much progress in New York; at least that kind of rapid transit that a commission was created to provide. The chief engineer of the present board has upset all the plans of the previous board of rapid transit commissioners, and his conclusion that an adequate scheme of transportation would involve an expenditure greatly in excess of the $50,000,000 which the municipality is authorized to devote to the purpose, has been approved by the experts appointed to pass upon the figures. The experts rather throw cold water on the whole rapid transit plan by remarking that its execution will be slow, and so many obstacles will be encountered that no immediate relief can be hoped for. As a suggestion for early relief, the experts recommend the comprehensive development of the existing elevated railway system, and this brings the matter back to the point where the first rapid transit commission found it. Those interested in the application of electricity to elevated roads will note that the experts recommend that locomotives be abandoned in case its views in reference to increasing the capacity of the Manhattan lines meet the approval of the commission. Probably no one questions that this change will be made in the near future. If the operation of the Metropolitan elevated road in Chicago by electricity is as successful as there is every reason to believe it will be, the steam locomotive, for this special service, will be doomed.

Retain the New Employes.

It is a satisfaction to note that none of the Brooklyn street railway companies whose lines were tied up by the recent strike cares to consider compromises from the old employes that involve the discharge of the new men. These men have earned their positions if ever men did; they risked their lives in order to secure permanent employment, and it would be an act of contemptible ingratitude if the managers discharged them, provided they are competent to perform their duties. To let them go to make room for strikers, many of whom have been guilty of assault and willful destruction of property, would be a meaner act than any yet imputed to the companies by their most malignant maligners. The attacks on these men, whose only fault has been the determination to earn an honest living, discloses the hollow insincerity of the fine pretensions of love for the workingman that issue from the inner councils of organized labor. The stand that the presidents of the companies have taken in pledging themselves to retain the new men who have been threatened and beaten during the last two weeks is commendable in the highest degree, and we trust that no argument will prove strong enough to induce them to recede from this position.

The Brooklyn Strike.

During the last week the incidents connected with the great strike in Brooklyn have been less exciting than during the days immediately preceding. The mobs have grown less turbulent, and the violence is now spoken of as "petty," except by those who directly suffer from it. The cutting of the trolley wires, however, goes merrily on, though some of those engaged in the wretched business have been arrested, and it is to be hoped will be adequately dealt with by the courts. The strikers and their sympathizers have been losing their enthusiasm for acts of violence and have been manifesting less and less confidence in disorder as a means of securing compliance with their demands. The men are abandoning lawlessness and the leaders have turned to the law and are invoking its aid in support of a hopeless cause. We present elsewhere in this issue, an account of the proceeding instituted by the leaders to secure the annulment of the charter of one of the Brooklyn companies. A person need not be endowed with the gift of prophecy to be able to predict that this appeal to the law will amount to little. The law is based on common sense, or at least is supposed to be, and it would be the height of absurdity to assume that the law would visit penalties on a company for failure to perform public duties which it was prevented from discharging by the crimes of striking employes. That this was the condition of affairs in Broooklyn was evident from the fact that even two brigades of soldiers co-operating with the police were unable to preserve order and protect property. The proof of violence by its own employes can be furnished by any one of the Brooklyn companies. In this same connection exception may be taken to a part of the recent opinion of Judge Gaynor, embodying his reasons for granting a writ of mandamus to compel the Brooklyn Heights Railroad Company to operate its cars. He says if the conditions in reference to hours of labor or otherwise are such as to repel labor, the companies "must adopt more lenient or just conditions. They may not stop their cars for one hour." This is equivalent to saying that companies must comply with the demands of their men, no matter how unreasonable they may be, if they threaten to strike, for in such an event it would always be out of the question for any company to resume operations within the time mentioned by the learned Court. It may be law that a quasi public corporation must do whatever its employes demand if they threaten to leave their positions, though we do not believe it, but it is certainly not justice. We have devoted considerable space in our news of the strike to a report of the proceedings of the State Board of Arbitration and Mediation. This report is highly interesting in many respects, but it discloses in a most striking fashion the utter incompetency and uselessness of these busybody peacemakers. The Legislature must invent some better means than this to compose labor troubles. Our report of the legal features of the strike occupies a large part of our space this week, but we believe the facts will be followed with interest, as they warrant one in believing that the strike has been conducted in accordance with the very latest teachings of professional agitators.

OPPOSITION TO GRADE CROSSINGS IN CONNECTICUT.

Since electric railway projects have been spreading with such wonderful rapidity in Connecticut, paralleling the tracks of the New York, New Haven & Hartford Railroad Company, a great deal has been printed regarding the attitude of that company toward the new enterprises. It has been assumed that the company proposed to fight the proposed competing lines tooth and nail, and a struggle between the contending interests in the Legislature has been predicted. It will be noted from the subjoined statement of First Vice-President John Hall, of the railroads of the railroad company that it does not occupy a position of antagonism to the electric roads, but it objects strenuously to the grade crossings that the trolley companies wish to construct at several points. Mr. Hall's statement, in which he defines the position of the company, is as follows:

"This corporation is not opposed to electrical railways per se. We recognize the popular side of the question, and we believe that the time may come when advances in science will render it practicable to employ electricity as the motive power for railways in general. We have not antagonized the chartering of electrical railways which would directly compete with us. The Consolidated has a broad and fair policy in this respect. You will remember that the corporation has nearly 1,700 miles of track, and that its stockholders' interests foot up in dollars an enormous sum. Of course this vast property must be jealously guarded.

" Our disposition to tolerate competing electrical roads is an evidence of the company's fairness. For short distances the trolleys have cut into our passenger receipts. We have taken off some trains because of trolley competition. There is a 12-mile branch between New Bedford and Fall River that is parallelled by the trolley line, and we have taken off a daily train each way. Up in Massachusetts, between Northampton and Williamsburg, the competing trolley has taken much of the passenger traffic. There are other points along the lines where the competition is felt. We expect this and still do not place ourselves in antagonism to the rival transportation concerns. According to indications the entire line between Springfield and New York will be paralleled by electrical lines. These companies run over public highways free of cost, and their construction is generally very inexpensive.

" Electricity bids fair to outdo steam in economy sooner or later. We are so keenly alive to the electrical system that we shall equip a branch to run by electricity as well as by steam during the coming summer. I refer to the Nantasket Beach line. We will test the matter by carrying the heavy excursion traffic by electricity. If the plan is successful, as it no doubt will be, we are in a position to use electricity on the main line between New Haven and New York. There will soon be completed four lines of track. Two of these can easily be provided with electrical power. With the perfect roadbed, heavy steel rails and stone ballast, cars may be moved at a rate of speed that would leave highway trolley cars far in the rear.

"There is, again, a favorable side to the developing of rival electrical roads. While those which directly parallel us compete injuriously for short distances, the lines running at lateral angles bring us new traffic. A trolley road running into new country four, six, ten or more miles away and communicating with our lines tends to increase our passengers. Thus we are justified in not antagonizing the cheap transportation plan.

"There is a great question involved, however, in connection with electrical roads that at present places us in direct antagonism with many of their promoters. It is the subject of grade crossings. To the crossing of our tracks on a grade by trolley lines we are unalterably opposed, and the entire energies of the corporation will be directed to prevent, by every legal and proper means, such crossing. The electrical railway companies are not as particular on this subject. Some of them are not permanent enterprises. Cheapness prevails in every point connected with them. Their projectors are so anxious to make money in floating their schemes that they entirely ignore even common prudence. The Consolidated road has expended and proposes to expend in the future millions of dollars to elminate grade crossings along its lines. Nearly all its crossings are now safe; soon all will be. The whole tendency of railway management is to eliminate grade crossings. As soon as a railway company becomes prosperous it seeks to remove this danger as rapidly as is practicable.

" The points at which the trolley people now wish to expose us to peril are Fairfield avenue, Bridgeport: in Bethel and one in Meriden. There are also other grade crossings in contemplation. We feel that we are only doing justice to the public, to say nothing of our own interests, when we oppose to the last these crossings. Our lines, some of them, teem with passing trains, many of which run at a very high rate of speed. A vehicle of the ordinary description, a carriage, a cart, or even a common horse-car, offers but little danger to an expresss train. But a heavy electric car, loaded with forty or more passengers is altogether too formidable an impediment to be disregarded. The chances are that if struck by a train, not only the occupants of the car would be killed or maimed, but the train would be derailed and its passengers also involved in the general ruin. Such an accident might, through no fault of ours, cost the corporation hundreds of thousands of dollars. The electrical current sometimes gives out suddenly. Imagine a loaded car stalled in the middle of one of our tracks just on the time of a fast express.

" The trolley people are apparently willing to assume any risk to their passengers in order to save themselves money. Here in Connecticut the general law forbids grade crossings except by special consent of the Railway Commission. The electric railway people have obtained special charters allowing them the right of way to cross tracks at grade without the consent of the Commissioners. The subject went to the Superior Court, which granted an injunction against such crossings; but on appeal to the Supreme Court the latter decided three to two, that the special acts superseded the general law."

◆

TEXAS STREET RAILWAY ASSOCIATION.

The Texas Street Railway Association met in Dallas Jan. 24. The session was devoted to an informal discussion of subjects of interest to the members. Among the topics touched upon were those of fenders, labor troubles and means of stimulating traffic. The question of providing reading-rooms for employes was considered, and almost all the members endorsed the plan. It was suggested that the reading-rooms should be supplied with periodicals of not too technical a character. The next meeting of the association will be held at Galveston. The following officers were elected:

President, W. H. Sinclair, Galveston.
Vice-president, C. A. McKinney, Houston.
Secretary, C. L. Wakefield, Dallas.
Executive Committee: W. H. Weiss, San Antonio; George B. Hendricks, Fort Worth, and the officers.

◆

NEW YORK RAPID TRANSIT.

At the meeting of the New York Rapid Transit Commissioners, on Tuesday last, the report of the five experts appointed to consider the figures recently submitted by Chief Engineer Parsons was presented. The experts found that the estimates of the expense of the plans considered by him were correct, agreed with him that the plan of construction under Broadway, as recommended by the previous commission, was unsatisfactory, and that his proposed substitutes were preferable, and they commended his idea of treating local and express traffic as two roads. The experts recommended a number of modifications in the plans previously made, which, according to their, figures, would reduce the cost to $42,063,721. It is recommended that wherever practicable, in the northern part of the city, viaducts instead of subways be employed. Fourteen miles of subways and five miles of viaducts are provided for. Pending the construction of this system, the Board of Experts urges that the elevated roads be required to furnish an improved service. What the experts mean by rapid transit is shown by their emphatic statement that it implies a speed of at least 25 miles an hour, including stops. They also recommend that the Elevated Railway Company use electricity instead of locomotive.

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LICENSING MOTORMEN.

A Brooklyn assemblyman has introduced a bill providing that motormen in cities of the first class shall be licensed. A resolution has also been introduced which contemplates the appointment by the Governor of three Commissioners, to serve at a salary of $1,200, who shall see to it that the provisions of the bill are conformed to. The bill provides for the appointment by the Mayor of three electrical examiners, who are to serve a term of two years, without compensation. They are empowered to employ an expert electrician for not more than 30 days in the year. His duty will be to conduct examinations of applicants at least once a month, and upon his favorable report the board will issue a license, which will be good in an adjoining county, except when this also contains a city of the first class. In that case, a new license must be secured from the Board of Electrical Examiners of that city. In case of a sudden emergency the board may employ three additional experts to conduct examinations. These are the qualifications which must be possessed by an applicant:

Section 3. Every applicant for the position of motorman, or for a position in a motor shop in a city of the first class, other than that of a skilled electrician, shall be a citizen of the United States, have resided within the State for a period of one year, and the county in which he proposes to be employed for three months prior to the time of making such application, and have been licensed as provided by this act; but such restrictions as to citizenship and residence license shall not apply to any motorman or assistant in motor shops who has been steadily employed as such for a period of three months prior to the time when this act takes effect.

The penalty for the violation of the law by a railroad company is a fine of $100, or thirty days' imprisonment or both.

The following resolution has been introduced in the Common Council of Jersey City.

Whereas, Employes of electric railways are without protection from employers and are subject to long hours and obnoxious rules, therefore the mayor and aldermen of Jersey City do ordain as follows: That each and every motorman now or hereafter employed by any electric railway company in Jersey City shall be an actual resident of Hudson County for at least one year at the time of his appointment, and shall not be employed in such capacity without first having obtained a license therefor.

That each license shall be issued by the city clerk and signed by the mayor and city clerk, and the corporate seal of the city shall be attached thereto, which licenses shall run for one year and shall cost the sum of $1. That any person who shall be employed contrary to the provisions of this ordinance shall suffer a penalty of not exceeding $5 for each offense.

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WASHINGTON CAR HOUSE BURNED.

The carhouse of the Brightwood Railway Company at Brightwood Park, a suburb of Washington, D. C., was destroyed by fire Jan. 25. Fourteen motor cars were burned. The total loss is estimated at $30,000.

ELECTRIC CAR LIGHTING SYSTEM ON THE NEW YORK AND BROOKLYN BRIDGE RAILWAY.

About the middle of this month the cable cars on the New York and Brooklyn Bridge will be equipped with electric lamps, and passengers will be able to read their papers in comfort. During certain hours after dark at the present time those who are fortunate enough to secure seats find that they are unable to read, as light from the oil lamps is almost completely cut off by the standing passengers. The bridge trustees have been criticised for furnishing to the patrons of the roads lamps of such feeble illuminating power, but there seems to be little ground for this complaint. The lamps are not inferior to those to be found in many railroad coaches and in the elevated railway cars. The lack of light of which passengers complain so bitterly is due to a great extent to the cause already stated. The introduction of the electric lights will be a great improvement. The bridge officials rather laugh at the cry that is raised against the wretchedness of the present lights; but there is no doubt that the public feel it to be a great hardship if the reading of newspapers is interfered with, even during a six-minute ride across the bridge. Again, the oil lamps at times smoke, and the odor is exceedingly objectionable in cars that are packed as closely as the bridge coaches during the busy hours of the day.

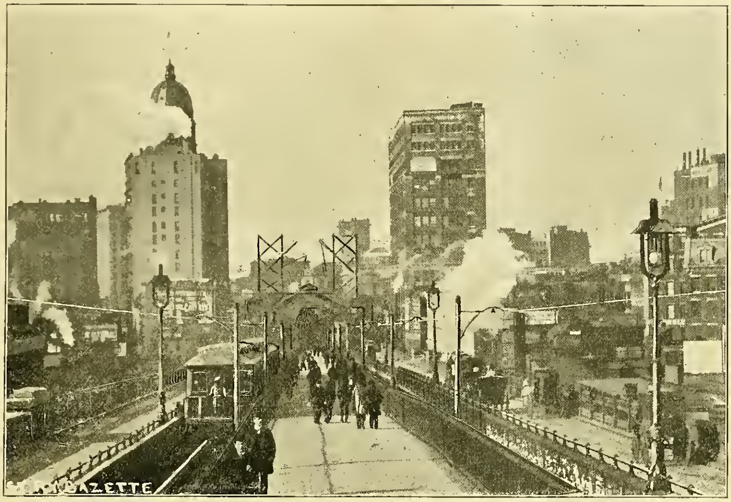

FIG. 1.—NEW YORK AND BROOKLYN BRIDGE—APPROACH ON THE NEW YORK SIDE, SHOWING POLES FOR NEW CAR LIGHTING SYSTEM.

The work of introducing the electric lighting system has been in progress since November and it is now nearing completion. Fig. 1 shows the appearance of the bridge with the new poles and wires. The view is taken from a point on the bridge structure looking toward the New York terminal. Sixty coaches are operated on the bridge and each of them will be equipped with ten 16 C. P. power lamps. The lights are distributed along the sides of the cars just below the line where the roof joins the side and above the heads of the standing passengers, Fig. 2. By this arrangement interference with the distribution of the light as now experienced is averted. The lamps, which are provided with handsome fluted opal shades, are placed in keyless sockets mounted on goose necks, and are arranged in two circuits, lamps being wired alternately on each circuit. Each circuit is furnished with switch and cut-out. The wiring in the interior of the cars is encased in hardwood molding that matches the trimming.

Current for the lamps is supplied by means of the overhead trolley system. The trolley leads extends over the roof and are carried on porcelain insulators along the edge of the roof and between the roof and lining of the hood. The wires extend through the hood and terminate in flexible connections, which may be joined, and the entire train lighted from any trolley.

The rails are connected by the Vail bond, Fig. 3, and are cross bonded at intervals of 500 feet. The return circuit is in no place connected with the bridge structure. Should the conductivity of the rails prove insufficient for the return, insulated track feeders will be installed.

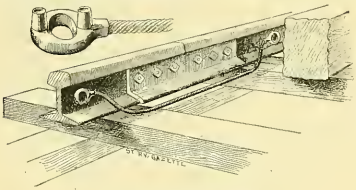

Fig. 3.—Vail Rail Bond.

The overhead conductor is supported by the suspended bridge structure, Fig. 4, except at the approach, where it is held by neat tubular poles, which are provided with brackets constructed of $1\frac{5}{8}$-inch wrought-iron tubing. The outer end of the bracket is curved and holds a short span wire with the necessary insulated trolley wire support. The poles are set into heavy cast-iron bases, which are secured to the masonry by expansion bolts through the coping and brickwork, Fig. 4.

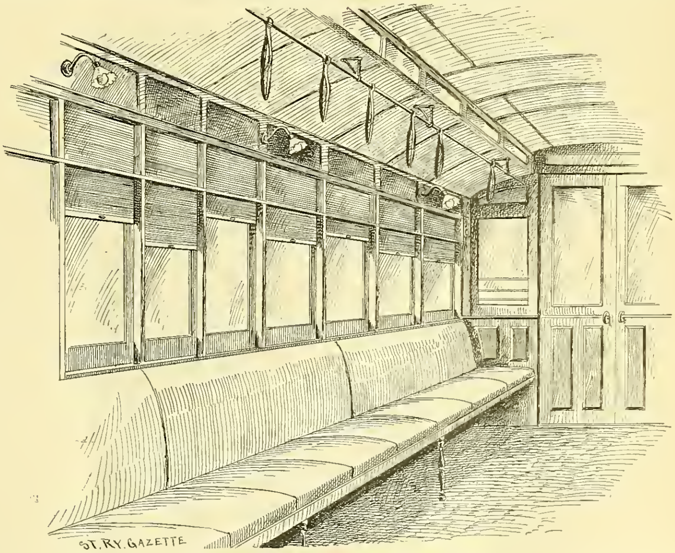

FIG. 2.—INTERIOR OF THE BRIDGE CAR, SHOWING ARRANGEMENT OF ELECTRIC LIGHTS.

The method of attaching the trolley wire to the suspended structure is represented in Figs. 5 and 6. The wire is No. 00 harddrawn copper. The insulators were supplied by the General Electric Company. Lightning arresters are located along the line and are grounded to the bridge structure.

The power plant will consist of two automatic cut-off engines of 40-H. P. each, directly connected to a 25 kilowatt multipolar generator furnished by the General Electric Company.

The switchboard, which is of marble, will be mounted on an iron frame and will be equipped with Weston and General Electric instruments.

The greatest pains have been taken to make the new system successful. The best material has been used, and throughout the work has been done in the most thorough manner.

The contract for the installation of the car lighting system was awarded by the Bridge Trustees to the Electrical and Mechanical Engineering and Trading Company, of New York.

◆

MEETINGS OF THE ARBITRATION BOARD.

The members of the State Board of Mediation and Arbitration have flitted about in wonderful and useless activity since the Brooklyn strike commenced. They might just as well have attempted to influence the weather as to effect any change in the attitude of the two parties to the controversy. They had the right to compel the attendance of witnesses at their meetings, but they lacked the wit to extract from them facts of importance. The sessions were utterly without significance, except as illustrating conclusively the uselessness of the board as at present constituted. William Purcell, editor of the Union and Advertiser, of Rochester, Chairman of the Board, scaled the loftiest heights of absurdity. Imagine this keen minded arbitrator asking the officers of the companies and the leaders of the men worn out by ten days of overwork, laboring under great excitement, bitter in their feelings, their judgments warped, their tempers heated, more ready for fight than for discussion, imagine this salaried peacemaker asking men in this frame of mind to suggest to the Legislature plans by which labor troubles might be averted. A report of the sessions of the board last week is presented herewith:

H. W. Slocum, President of the Coney Island &

Brooklyn Railroad Company, was the first witness. Questions were propounded to him by William Purcell, Chairman of the Board:

Q. Could you state to the Board the causes that led up to the strike? A. My personal knowledge is restricted to what I have read in the newspapers and to casual conversation with President Lewis as to what was going to happen before the strike took place.

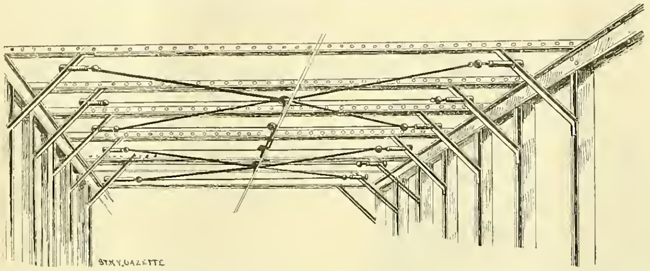

FIG. 6.—CONSTRUCTION AT THE SLIDE, WHERE ALLOWANCE IS MADE IN THE STRUCTURE FOR EXPANSION AND CONTRACTION.

Q. From what you have learned from Mr. Lewis and from what you have read, what, in your judgment, were the causes of the strike? A. The moving cause is that the men wanted 25 cents a day more than they were getting. That was the original demand of the men. The companies made up their minds to fight, as they couldn't afford to comply with the demand. What caused the complications afterward I don't know.

Q. Don't you know that the same contract was presented to all the companies? A. There was nothing about wages at all in the proposed contract on my road. That question came up last and the men at once waived it.

Q. How about the hours of labor being restricted to 10 hours. A. That was in all the contracts, the question as to 10 hours.

Q. Were there other differences? What about the 10 hours? A. There was no such demand on my road. I told the men on the Thursday before the Monday of the strike that I would sign the contract, with a few conditions, and that on Monday I would waive my claims, if they would make a slight concession of the time schedule. This was done.

Q. Was the question as to trippers mentioned? A. They wanted two straight runs to our trippers: they gave two runs additional, giving us a proportion of a little over one-third of trippers.

Q. Then the principal demand was for an increase of 25 cents a day? A. Yes, that was the moving cause of the strike. Then came other demands by strikers and the original cause was lost sight of, as often happens.

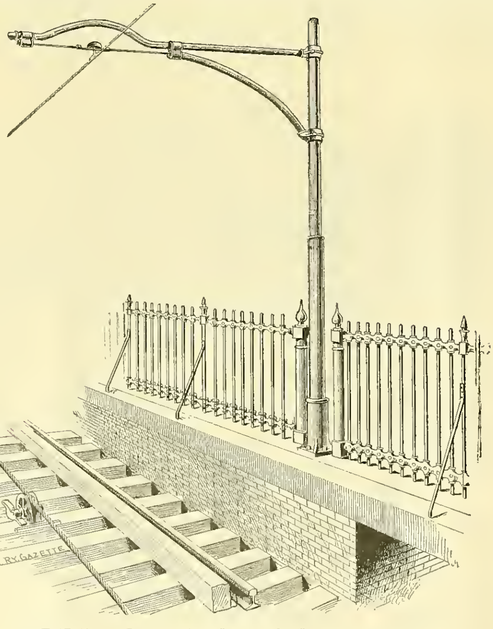

FIG. 4.—TUBULAR POLES USED ON BRIDGE APPROACHES.

Q. What measures may be adopted by legislation to avoid such occurrences in the future? A. Well, I only got your subpœna at 1 o'clock this afternoon. I'm frank to say it's a question whether organization of the men is a cause of strikes or not. I've no opinion on the subject. Whether there should be legislation against capital or labor or not is a delicate point. My men can organize with my full permission.

Q. But could any legislation prevent such strikes with regard to the companies or the men? A. I suppose the Legislature could prohibit strikes.

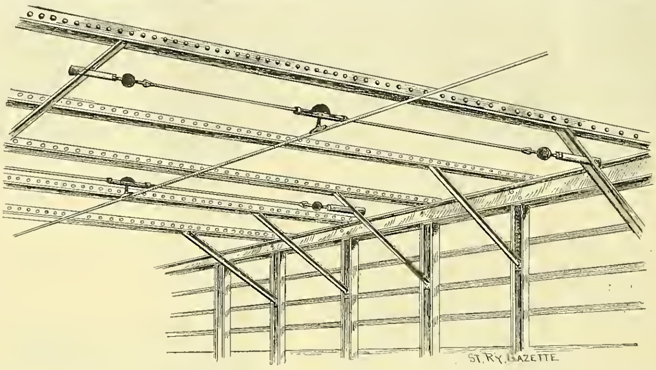

FIG 5.—OVERHEAD CONSTRUCTION ON THE SUSPENDED STRUCTURE OF THE BRIDGE.

Q. There's no question as to the power of the Legislature, but what would you advise? A. The question is, what would anyone advise?

Q. Yes. If you could conjure up any scheme to avoid strikes it would be a welcome contribution to the question, which is now being debated, even in Congress, as to the Chicago strike. You are the president of a railroad company and you should know what to advise. A. Well, I have nothing to say but what I have already said.

Judge Robertson: Of course legislation should bear on both sides. A. Yes, and we have enough to contend with now. A railroad man wouldn't want to say anything that would bear hard on his men. Whatever is legislated about strikes, it will injure the independence of the railroad company or will tie up the men, that's certain. Any enforced arbitration, so to speak, I would not be in favor of. We run 7½ miles of single track and have 300 employes. If I had a strong suggestion to make, I would do it in a moment. It seems to me that it would be folly to make any suggestion to the assembly in the matter.

President Lewis, of the Brooklyn Heights Railway Company, who was the next witness, replied to several questions as follows: "The main reason of this tie-up was that the strikers or their representatives in the Knights of Labor were determined to exercise the functions which the State of New York has placed with the board of directors of our company. They sought to do that partly by the contract presented to us. They insisted upon directing when trips should be run, what cars should be run and what time cars should be run, which we could not permit them to do. I am confirmed in this belief, too, by the reason that when I made a proposition to the men, by consent of the directors, covering the proposition I had made to this committee, they would not listen to it, not even waiting to have a circular printed."

Q. What course would you recommend to the Legislature to pursue for the prevention of strikes? A. I must say that that question comes so suddenly upon me that I am unable to say anything regarding it. If I had time I might be able to express some opinion.

Q. Could you give your views in writing tomorrow? A. No. I don't think the strike is over sufficiently.

Q. Could you send us your views at Albany? A. I can't see my way to do it. We have opened 19 new lines to-day and every minute of my time is occupied.

Q. Will you do it as soon as you can? A. Yes; but I can't give an offhand opinion. It seems as though some legislation is necessary to prevent any such occurrences as this.

Martin J. Connelly, of the Executive Board of District Assembly 75, Knights of Labor, and the leader of the strike, was called to the stand. In response to questions he said:

"The strike would not have taken place if Mr. Lewis or officers of the Brooklyn Heights Company had not locked out employes on the Sunday evening before the strike. The electricians were asked if they would take the motormen's places in case there was a strike. The electricians refused, and that began the lockout.

"Second, it is not true, as President Lewis says, that we tried to dictate what cars should be run. What the President wanted was to do away with all the $2 cars and make them $1.50 cars.

Q. You regard a failure to make a contract the same as for years before the first cause of the strike? A. Yes, that with the lockout of the men. Both together.

Q. Have you any suggestion as to legislation that would prevent such occurrences? A. I would suggest that the railroads be owned by the city of Brooklyn. That would be a great relief to street car employes all through the State.

John Giblin, of the Executive Board of District Assembly No. 75, K. of L., was the next witness. As to the causes that led up to the strike he said:

"First, the companies refused to give to the employes the same proportion of cars as when horse cars were used.

"Second, employes run more trips than when horse cars were used. They are compelled to work 10 hours with no resting time at the ends of the road. On the Bergen street road, where I work, we have no time allowed, practically. The companies furthermore refuse to arbitrate. The men agreed to place their cause in your hands."

Q. That was since the strike. What were the causes that operated before the strike? A. Another cause was that electricians were locked out. The railroad authorities refused to subscribe to the clause requiring them to obey the 10-hour law, as it would have required them to take off some of the trips in order to bring the men's time into ten hours. They encroached on the men's time in order to give extra trips. As a preventive legislation the Legislature should, I think, pass a law to compel the railroads to arbitrate.

Q. Would the men consent to abide by this compulsory arbitration? A. I think so. I think, too, that courts should have the power to decide immediately on all questions of strikes. If that had been the case, this strike would have been settled nine days ago.

President Norton, of the Atlantic Avenue Railroad Company, was the next witness. In reply to questions he said:

"I might say in a general way that my opinion of the cause of the strike is that the Atlantic Avenue Railroad Company would not do what the Executive Committee of the Knights of Labor wanted them to do. As near as I can get at it, there are three reasons for this. One was that they were not willing to sign an agreement covering our shop men and electrical workers, because in that agreement it was proposed to restrict the number of apprentices in our shops, and at the same time increase the wages of the shopmen, and the other was that we would not increase the wages of motormen, conductors, car cleaners, etc., mentioned in the proposed agreements and we were not willing, beside that, to sign any agreement in which there was any clause which required the Atlantic Avenue Railroad Company to run a fixed number of regular cars and a fixed number of tripper cars on its schedules. Those were the reasons, I think, for which the men declined to work for us any longer. I might say that the men asked me two days before the strike if this decision was final, and my answer was emphatically, yes. It was 4 o'clock Monday morning when I was notified of the strike and we have enough men now and are turning away applicants."

In regard to legislation on strikes, President Norton said:

"I have one idea only on that point, which I jotted down to-day, and that is, to let the Legislature pass a law compelling a man employed by a corporation having a public duty to perform to give at least ten days' notice of his intention to leave that company's service unless sickness or some other unavoidable reason compels him to leave the company or he is discharged for cause. That is the only way out of the difficulty as I see it now."

Mr. Feeney—Would you have some legislation imposed on the railroad companies? Would you recommend law by which the companies should be compelled to give 10 days' notice to the men? A. Well, discharge for cause covers all that. Our men are dismissed only for reckless driving, for dishonesty or for drunkenness. Such men do not deserve consideration. A man has a life position on our road if he behaves himself. Some of our men have been on the road 15 and others 20 years. They didn't want to go out with the strikers, but were compelled to stay away from work from fear of strikers. We need a law to prevent labor organizations from interfering with individuals in the employ of the companies and to prevent the forcing of new men to join labor organizations.

Mr. Feeney—How about the companies giving the men 10 days' notice of change in wages? A. If it is the companies' intention to decrease wages, I think it would be a good plan to have a law to compel railroads to give the men a chance to get other employment. But in the case of an increase of wages the men would not need a notice of an increase. They would be very glad to get it without notice.

W. L. Holcombe, a member of Executive Committee of District Assembly No. 75, Knights of Labor, said there were two causes of the strike. One was the interpretation of the meaning of the 10-hour law. The companies wanted to interpret it to mean that the men should be required to work 12 hours, and wanted the labor representatives to sign an agreement that would permit such an interpretation. That the labor representatives refused to do. Second, the employes asked for an advance of 25 cents a day additional for skilled labor, and this was refused. Of course minor considerations came in, such as the proposition of trippers that should be run. The companies declared that the men in wanting the number of trippers reduced were trying to interfere in the companies' business. The men deny it. They consider their work as piece work, and want all-day trips for some of the men so as to give extras at least 50 cents a day.

On the question of recommendations to the Legislature Mr. Holcolmbe said that arbitration must be compulsory on all the corporations engaged in serving the public when any dispute arises between the corporations and their employes. Any decision should be binding on both the corporation and employes and should be enforced by the State.

Mr. Feeney—Would the men abide by such decision, in your opinion? A. I think they would. The bill introduced would have to be one in which labor would have a representation. If labor should have no representation in the tribunal proposed to be created, then labor men would cry that they were not represented. Several plans, the witness said, had been discussed in labor circles, especially by the Knights of Labor, on this subject, and the plan that had met with the most approval was that there should be added three members to the present Board of Mediation and Arbitration. Each side, employers and employes, should select one representative to be added to the board, which would then consist of seven members. Several lawyers of eminence had offered their services to frame a bill for laboring men to be introduced into the Legislature.

Colonel Partridge, President of the Brooklyn City and Newtown Railroad Company, said, after he was sworn: "A demand on the part of the men for higher wages and a refusal on the part of the roads to grant them were the causes of the strike."

Q. How about the demands in the new contracts on all roads? A. They demanded on our roads that all our time tables should be submitted to a committee of our own men and await their decision. We objected that this would enable them to run the road. Another point the men made was that any request for leave of absence should be granted. This was objected to by us, as there might be demands for absence when it would be inconvenient for the road to grant them. There were also restrictions as to trippers, which would entail an increase of pay beyond the $2.25 demanded.

Q. As to legislation for street railroads that will be probably attempted in this session have you anything to offer? A. That's a pretty hard question. In a general way, I will say we do need legislation to prevent inconvenience to the roads, the public and employes, resulting in a strike without proper warning. Exactly what legislation is needed it is difficult to say. Legislation should be very deliberate and not be pushed through while we are in the midst of these troubles. There are three parties to be considered, viz., railroads, the public and the employes. They all have rights to be conserved.

Mr. Purcell—President Wicker is sick and both he and President Lewis have consented to give their views in writing in the next two or three days to be put into our report. Can you do it? A. Possibly, but I don't believe I could say anything more than I have said. Railroading is a very complicated matter and it will be difficult for legislators to pass laws wisely on the subject. Roads, for one thing, differ as to paying capacity. One of our lines is an all the year round line. Another is largely an excursion line and it does not pay so much. We have many cars lying idle and there is great expense. It would be manifestly unfair to legislate as though all roads were alike.

STREET RAILWAY LEGISLATION IN INDIANA.

It is evident that considerable attention will be given to street railway measures introduced in the Indiana Legislature during its present session, writes an Indianapolis correspondent of the Street Railway Gazette. Rights of way and other franchises have been secured for a network of electric railways over the entire northeastern part of the State. The evident purpose is to connect these suburban roads with the city of Indianapolis, and the Citizen's Street Railway Company views the threatened legislation with alarm. Two bills have already been presented to the House, one providing for the right, by a suburban street railroad company, to use the tracks of a street railway company in cities of over 100,000 inhabitants, and to allow such suburban companies to string trolleys or span wires on their poles. The compensation for the use of the tracks or poles shall be fixed by the Circuit Court. Another bill provides for the use of local tracks in cities by suburban roads and compels the local company to furnish the electric power to run the suburban cars over such local tracks. The present law provides for the use of the local tracks by suburban roads, but does not require them to furnish the power. A powerful lobby will be on hand to advocate the passage of these measures.

THE BROOKLYN STREET RAILWAY STRIKE.

It was apparent by the end of last week that the Brooklyn street railway strike was a failure. The companies had then secured a sufficient number of men so that service of a satisfactory character could have been resumed on most of the lines had not the strikers persistently continued the practice of cutting wires. Cars were late in starting out every morning as a result of this form of criminal attack on the companies. Open violence decreased as the disorderly element found that arrest and punishment were likely to follow assaults on new employes and the stoning of cars. The police force proved itself to be less inefficient than during the early days of the strike. At the time when the disorder was at its worst and when the most daring acts of violence were done the officers scarcely arrested a rioter. As the disturbances gradually became less serious the police displayed less open sympathy for the rioters, and law-breakers were gathered in considerable numbers.

Brooklyn quieted down to such an extent on Monday last that it was thought safe to allow the members of the First Brigade of New York City to return to their homes. The operation of cars, however, was still not unattended with difficulties. President Lewis, for example, referred as follows to the occurrences of Monday:

> We sent a wagonload of men to Flushing avenue and Nostrand avenue this morning. The strikers, who had been attending a meeting near by, assaulted those men, beat them very badly and one man may die. He is nearly dead now, I guess. I do not think there were any arrests made. The cars which were started on the Union avenue line yesterday were attacked. One of them came back to the depot with nothing left to it but the top and the trucks or running gear. Our men picked 47 stones out of the car after it was in the depot. The cars on Lorimer street and Bushwick avenue met with a similar fate. Several motormen and conductors were beaten. A very serious assault took place at Nostrand avenue, which the papers have made note of Our linemen were assaulted also while going to Gates and Hamburg avenues, and at Broadway and Gates avenue one of our electricians was shot in the leg. His name was Livermore and he was one of our best men. A number of our men on the lines in the eastern district have been so frightened by the attacks upon the cars that they have notified us they will not operate the cars unless they are given better protection. I do not blame them. Wires were cut last night at 5:45 at Meserole and Union avenues, at 8:22 in Meeker avenue, at 10:15 in Greenpoint avenue, at 11:45 in Manhattan avenue, at 11:50 at Halsey and Heyward streets, at 11:55 at Lorimer and Nassau streets, at 12:10 a feeder wire at Willoughby street and Hudson avenue, at 1:40 at Fulton and Rockaway avenue, at 2:40 at Franklin avenue and Bridge street and at Lorimer street.

LEGAL ATTACKS ON BROOKLYN COMPANIES.

The success of the companies in running cars was, however, such as convinced the striker leaders that new tactics were necessary to keep up the courage of the men. It had been demonstrated that the companies could not be brought to terms by riots and wire-cutting, so it was decided to turn to legal attacks on one of the corporations. Proceedings were instituted to have the charter of the Brooklyn Heights Railroad Company set aside on the ground that it failed to give proper service to the people of Brooklyn. The complaint was sworn to by John Giblin, Secretary of the Executive Committee of the Knights of Labor. In it he called attention to the necessity of having competent men to operate the trolley cars and to the fact that all of the men who had been in the employ of the railroad were competent men and worth more than the amount of money which they had been receiving, because the pay was now no greater than the pay for operating horse cars, which was much easier. He called attention to the alleged locking out of the electrical workers by the railroad company for the purpose of forcing the men to come to terms with the company, which had rendered the railroad unable to perform its duties. Finally the complaint asked attention to the fact that the men had offered to return to work at the same rate of wages and under the same condition which prevailed last year. These terms not being accepted by the railroad, and the lines not being operated as they had been previous to the strike, were considered reasons for the Attorney-General starting proceedings to annul the charters. The complaint was attested to by Andrew D. Best, another member of the Executive Committee.

On Wednesday Attorney-General Hancock gave a hearing at Albany, at which arguments urging him to institute proceedings to secure the annulment of the company's charter were presented on behalf of the strikers. The counsel for the company asked for delay in order that affidavits denying the allegations of the petitioners might be prepared. The Attorney-General decided to grant the request and postponed the hearing until Monday next.

In the last issue mention was made of the fact that Judge Cullen, of Brooklyn, had denied an application for a mandamus compelling the Brooklyn Heights Street Railroad Company to operate the full number of its cars. The court found that the companies were not adequately protected, and consequently an order compelling them to resume the regular routine was to all intents and purposes equivalent to directing them to do the impossible. Another proceeding, practically identical, was instituted before Judge Gaynor, of the Supreme Court, by Joseph Loader, a Brooklyn merchant, who prayed the court to issue a mandamus directed against the Brooklyn Heights Railroad Company. To the great surprise of the public, Judge Gaynor decided to grant the writ. His decision is given herewith. The question was left open whether the writ should be peremptory or alternative—that is, whether the company should be required to operate their cars at once, or whether a hearing should be had to determine questions of fact.

It is my duty to declare the law of this case. This railroad corporation is not in the position of a mere private individual or company carrying on business for private gain, which may suspend business temporarily or permanently at pleasure. On the contrary, it has a dual relation—a public relation to the people of the State and a private one to its stockholders. It must not be forgotten here, though it may seem to be growing dim, if not wholly forgotten elsewhere, that in its chief aspect it is a public corporation, having duties to perform to the public which transcend any obligation which in its private aspect it owes to the stockholders. It has received franchises of great value from the state and has conferred upon it the State's transcendent power of eminent domain. In return it took upon itself the performances of public duties and functions, in the performance of which it is, in law and in fact, not an independent individual or entity, but the accountable agent of the State. Though these principles are old and inherent in the idea of the sovereignty of the people, it would seem that in the recent rapid growth of corporate power, and of the tendency to use public franchises for the aggrandizement of individuals first and for the service and benefit of the public second, they have come to be somewhat overlooked and need to be restated. They have often been declared by the highest courts of this State and the Supreme Court of the United States (Olcott v. The Supervisors, 16 Wall, 687, 694; Bloodgood v. The Mohawk, etc., R. Co., 19 Wend, 9; The People v. N. Y. C. & H. R. R. Co., 28 Hun, 543). The duty of the company now before the court is to carry passengers through certain streets of Brooklyn, and to furnish, man and run cars enough to fully accommodate the public. It may not lawfully cease to perform that duty for even one hour. The directors of a private business company may, actuated by private greed or motives of private gain, stop business and refuse to employ labor at all unless labor come down to their conditions, however distressing, for such are the existing legal, industrial and social conditions. But the directors of a railroad corporation may not do the like. They are not merely accountable to stockholders; they are accountable to the public first and to their stockholders second. They have duties to the public to perform and they must perform them. If they cannot get labor to perform such duties at what they offer to pay, then they must pay more and as much as is necessary to get it. Likewise, if the conditions in respect of hours or otherwise which they impose repel labor, they must adopt more lenient or just conditions. They may not stop their cars for one hour, much less one week or one year, thereby to beat or coerce the price of conditions of labor down to the price or conditions they offer. For them to do so would be a defiance of law and of government which, becoming general, would inevitably, by the force of example, lead to general disquiet, to the disintegration of the social order and even the downfall of government itself. Experience shows the wisdom of our fathers in retaining at least some control of corporations to whom are given public franchises for the performance of public duties. The law of this case was too clearly stated by Mr. Justice Cullen to be misunderstood in an application similar to this a few days ago. That learned judge held that the company had made no adequate answer to the case presented against it, and only withheld the granting of the writ to give the company more time to conform to the law which he so clearly enunciated, probably in the reasonable hope that that would suffice without a resort to the coercive power of the people of the State lodged in the court. In addition, however, I shall quote from a case decided upon appeal by the Supreme Court in this State in 1883, after mature deliberation, and which is an authority which I am bound to follow, even though I were not of the same view, and which, I need scarcely say, the corporation now before this court is bound to acquiesce in, and which, I doubt not, will immediately acquiesce in, for example's sake, if for no other reason. That case arose out of the failure of the New York Central & Hudson River Railroad Company to receive and forward freight as a common carrier. The language of the court is as follows: "According to the statements of the case, a body of laborers acting in concert fixed a price for their labor and refused to work at a less price. The respondents (the railroad company) fixed a price for the same work and refused to pay more. In doing this neither did an act violative of any law or subjecting either to any penalty. The respondents had a lawful right to take their ground in respect of the price to be paid and adhere to it if they chose, but if the consequence of doing so were an inability to exercise their corporate franchises to the great injury of the public, they (the railroad company) cannot be heard to assert that such consequences must be shouldered and borne by an innocent public, who neither directly nor indirectly participated in their causes." (The People vs. N. Y. C and H. R. R. Co., 28 Hun , 543) The court in that case allowed a writ of mandamus to compel the corporation to do its corporate duty.

That a private citizen has sufficient standing to make this application, which could unquestionably be made by the Attorney General of the State, has heretofore been twice decided by this court, and I must accept it as law. And it being admitted that the company is not fully operating its lines of road, it follows that it is my duty to allow the writ prayed for; either in its peremptory or alternative form, unless a sufficient answer has been made in law. As I have said, the learned judge who heard the previous application decided that the answer then made was even insufficient to raise a question of fact and only refused the writ in order to give the company more time, with an admonition to it that it should not longer delay. I do not think the present answer of the company is sufficient to prevent a writ from being issued. The claim of violence amounting to a prevention is not legally made out. Instances of violence, generally by others than the former employees of the company, are shown, but it is also shown that not only the police force of the city, but also over 7,000 soldiers are preserving order, and I cannot believe that this company is not protected in its rights, nor do I think any question of fact is fairly raised on that head. Beside, the persistence of the company in failing to run its cars, except as it may gradually get employes to accept its terms, being in itself unlawful, as I have shown, must necessarily by its bad example tend to public disquiet, if not to some disorder. In respect of the question of hours and of wages between the company and its employes, its duty was to have gone on and now is to go on with its full complement of employes, having the right gradually and from day to day to supersede its employes if it can by new employes who will work on its terms, or to supersede them all at once when it has obtained a sufficient number of new employes for that purpose; but in such a controversy it has not the right to stop its cars while it is thus gradually getting other men. If the people of the State were running these roads they would not thus incommode and damage themselves; and it must not be forgotten that this corporation is entrusted with the running of these roads as the servants of the people of the State. It therefore only remains for me to determine the form of the writ, whether it shall be peremptory or alternative. In one aspect of the case there seems to be an issue of fact presented, and if such an issue be presented the law does not permit me to decide it and allow a peremptory writ, but requires me to allow an alternative writ; which has the effect of reserving such issue of fact to be tried by a jury, or by the court if so agreed upon. At one place in its answer the company avers that a reason why its employes would not continue working for it was "that it refused to run its cars as required by said employes in respect to the frequency with which cars should be run and the number of cars to be run." The number of cars or trains which a railroad shall run is left to the sound discretion of its directors, subject to review by the courts upon an application for a writ of mandamus to make them run more if the public convenience require it. Its employes may not assume to determine the number of cars to be run. If, however, this allegation in the answer refers to the controversy in respect of what are called trippers, then it has no force, for that controversy is in its essence one in respect of hours and wages. I concur in what Mr. Justice Cullen said in the other case in that respect, namely : "I do not regard the alleged attempt to abolish trippers as interfering with the running or management of the road, because I imagine the company would be allowed to run as many trippers as it chose, if it would only pay the men $2 a day for running the trips. In that case I imagine there would be no trouble. So that this is really a question of wages. Each party has the right to obtain the best terms it can, and, as was said in the freight handlers' case, if the company cannot get men at a price it thinks fair, it is bound to get them at a price it may deem exorbitant, because its duty is to run its road." Such was the disposition of that point by the learned justice.

The counsel for each side will be heard at 10 o'clock, on Jan. 25, as to which form of writ shall be issued.

The strikers had great hopes that a peremptory writ would be issued. In that event they trusted that the inability of the company to operate its cars would be demonstrated and that it would be compelled to employ its old men in order to conform to the mandate of the court. After hearing counsel, Judge Gaynor decided to issue an alternative writ of mandamus and gave the company 20 days in which to make answer. This decision overthrew all the hopes that were based on the court's action. It was thoroughly realized that within 20 days the companies would be able to resume business as usual and that the writ, therefore, would be obeyed beyond all question. Judge Gaynor's opinion in this case is as follows:

My views of the case remain substantially the same as they were at the close of the argument upon the first hearing. This corporation is primarily a public one, and its first duty is to the public. Its private duty to its stockholders cannot lawfully stand between it and its duty to the public. It is entitled to the full protection of government in the performance of its public duties ; protection on the one side and obedience to law and duty on the other being reciprocal and going hand in hand. It has had such protection, and it now has it. I do not find that government has failed in that respect at all. Instances of disorder have occurred, but have been speedily suppressed.

I cannot, therefore, attribute to government the failure of this corporation to perform its public duties, and deny this application. It follows that a writ of mandamus must issue. This court upon this application stands between the public and this corporation, and may not swerve from a full declaration of the law of the case or from a full compliance with it.

That this corporation is not fulfilling its ordinary corporate duties to the public is not denied. It presented the issue to the court that the reason for it is that it is overcome by violence, and that government does not adequately protect it. This might be a sufficient answer in law if true, but I refuse to find that either the judicial or the executive branch of government has failed in affording protection to this corporation. There is no evidence before me upon which I can cast such a reproach upon the State. It was mentioned on the argument that two other street railroad corporations in the city of Brooklyn have been all the while running their cars in the usual manner.

This corporation has the right to get labor as cheaply as it can, but it may not, without a violation of law, stop the running of its cars to try to beat down the price or legal conditions of labor. It was its duty and now is its duty to run its cars at the best terms it can make for the day, being at full liberty to supersede its employes gradually, from day to day or all at once if it have men enough, at lower or better terms. Its chief duty is to run its cars, and all considerations of private gain to its stockholders must yield to that.

In my former opinion I showed this to be the law of this State, declared by its courts, and I shall not now enlarge upon it. There being disputes in the case as to some of the facts, the law makes it my duty to allow an alternative instead of a peremptory writ, but, though the command of the people be less abrupt or peremptory in that form of the writ, it nevertheless is the people's command. I also prefer to issue the alternative writ, as that is the more moderate course, and should prove sufficient.

In view of some things said upon the argument, it is not improper for the court to say that it has no fear of any obstruction to this writ of the people, for this community is law abiding. Nor is it improper for it to suggest that violence or menace or wrongful interference of any kind should wholly cease, so that in the end it may be said that if there was any violation of law it was not by the people; and in due time, wherever the wrong or the weakness lies, it will be remedied peacefully and in order in one way or in another.

Let, therefore, an alternative writ of mandamus in the name of the people of the State of New York issue, commanding this corporation to resume the operation of its roads and the accommodation of the public as fully and completely in all respects as it was doing prior and up to Jan. 14 1895.

On Wednesday last, the strikers determined to institute proceedings against President Norton and Daniel J. Quinn, superintendent, of the Atlantic Avenue Railroad Company. Warrants were sworn out against them by a former conductor and a motorman of the road who alleged that they had violated the law which makes it a misdemeanor for any officer of a surface or elevated railroad company in cities of over 100,000 inhabitants to compel employes to work more than ten hours in any twelve consecutive hours. The examination will take place next week.

On the following day another warrant was sworn out before a United States Commissioner, charging President Norton with violating the United States law by placing United States mail signs on cars that did not carry mail.

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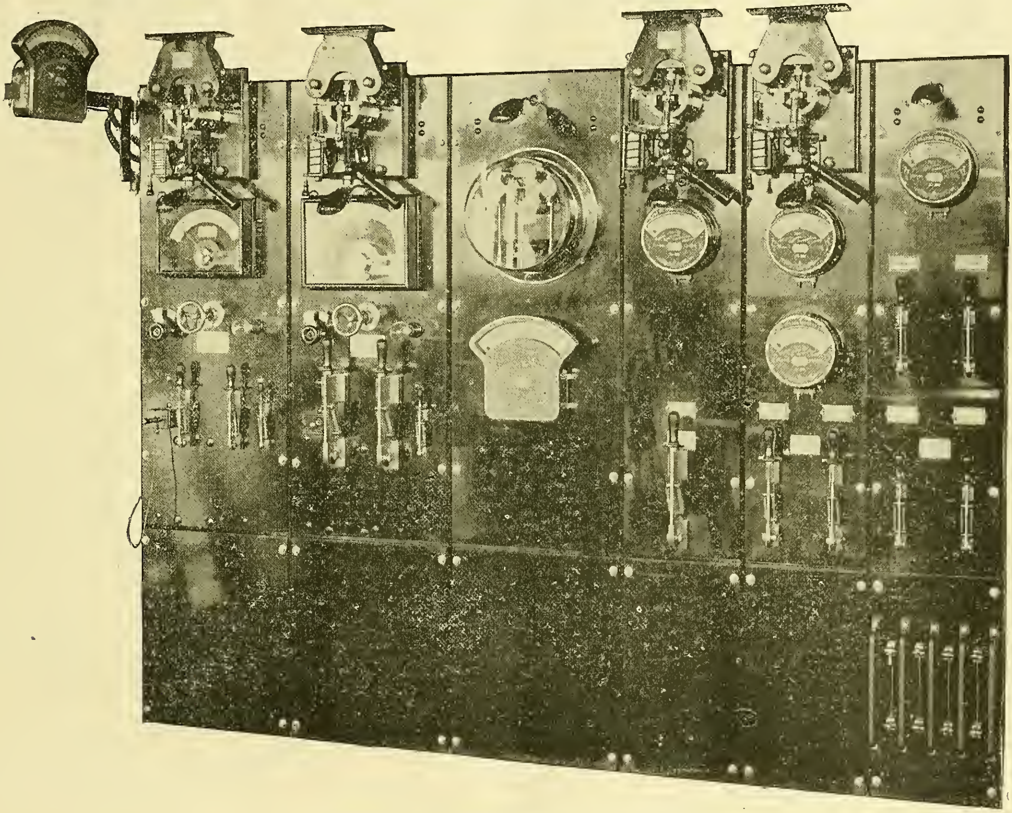
OPENING FRONT GATES.—The opening of the gates on the front platforms of the Philadelphia Traction cars is a great convenience to the public. However, it packs the cars much closer and requires more work on the part of the motormen to avoid accidents from the jumping on and off of the venturesome.—*Philadelphia Times.*



GENERATOR AND FEEDER PANELS FOR SWITCHBOARDS.

GENERATOR AND FEEDER PANELS FOR SWITCHBOARDS.

The panel type of switchboard has been developed by the General Electric Company in response to a demand from electric railway, power and lighting companies for switchboards which are easy of installation, convenient in operation, ornamental in appearance, but, above all, capable of ready extension to meet enlargements in station output. Each of the panel boards is complete in itself and additions can be made as desired by adding panels adjoining those already installed. Those especially designed for railway service are of two general kinds, generator and feeder panels, which are usually supplied in enamelled slate or in marble and are of a uniform height of 90 inches.

The generator panel is 24 inches wide and carries all the devices needed for the regulation of a single generator. At the top is a circuit breaker capable of adjustment through a considerable range of current and adapted to break the generator circuit instantly should a dangerous overload be thrown upon the machine. The construction of the circuit breaker is such that the heaviest current can be safely interrupted by it.

Below the circuit breaker is the ammeter which in panels up to 1,000 amperes capacity is of the Thomson-Houston type with damping arrangement that renders the needle almost dead beat; for larger panels a Weston illuminated dial ammeter is provided. The range of the ammeter is, in all cases, 50 per cent. greater than the capacity of the panel.

The main switches are single pole and quick break, the positive and negative being mounted on the panel. The equalizing switch is mounted on a pedestal placed near the generator, and the length of the equalizer is thus reduced. The principal advantage in having the positive and the negative switches single pole lies in the fact that when other generators are running, the series coil of the generator to be started may be connected in parallel with those of the generators already in operation. Variations due to the compounding effect are thus neutralized before the generators are connected together, and the generator takes up the load smoothly on the closing of the negative main switch. A proper separate excitation and correct polarity in the generator to be started are at all times ensured.

The lightning arrester is known as Type I R and consists of an iron clad electro-magnet in the field of which are two carbon points separated by a one-thirty-second inch air gap. The points are connected between generator lead and ground, and the small air gap is a much weaker dielectric than the insulation of field and armature. The magnet is connected between the generator and line, and the induction of its windings afford additional protection to the generators against lightning.

The field rheostat for controlling the potential due to the shunt field is placed at the back of the panel, and is of the Carpenter enamel type. It is operated by a hand-wheel on the front of the panel. A discharge resistance of 500 ohms is attached to the field rheostat to cushion the discharge when the field switch is opened. It is connected in series with a pilot lamp on the front of the panel.

The field switch for the shunt field of the generator is of the regular three-point type and is set at the left side of the main switch. The lighting switch, which is single pole of 100 ampere capacity and quick break, is placed at the right of the main switch on each panel and is connected to the negative terminal of its generator between it and the negative main switch. The positive side of the lighting circuit is connected through a magnetic cut-out to the equalizing bus, and current may be supplied to two lights from any generator whether its circuit breaker or main switch is open or closed.

The voltmeter is a Weston illuminated dial instrument mounted on a swing bracket at the left or right side near the top of the panel. It is connected by the insertion of a plug in the four point receptacle on the front of the panel. Two of the points are connected to the terminals of the generator between it and the main switch: the other two to the bus bars of the voltmeter.

The generator panels are limited in capacity to the sizes of the conductors, and are built in six standard classes for 200, 400, 600, 1,000, 1,500, and 3,000 amperes. They may be used with generators of different types, but of approximately the same capacity, the rheostat being made to conform to the different type of generator which may be employed. Vertical angle irons and stay rods are used to support the panels and are furnished with them.

The feeder panels are of a length similar to that of the generator panels, but are only 16 inches wide. The practice which has hitherto obtained of placing entire dependence upon the generator circuit breakers to protect the station in case of external short circuit, has been abandoned, and the overhead line is divided into sections and each feeder panel corresponding to that section is in turn equipped with an automatic breaker. Only the feeders upon which trouble occurs are thus thrown out. This method of distribution places the line under better control, as it makes it possible to throw out by hand individual sections without injury to the generators.

The feeder panels for higher loads are equipped with automatic circuit breakers, ammeters and quick break switches. In those for lower loads, fuses may be employed. These panels, being of uniform height with the generator panels, may be bolted side by side with them to form a uniform switchboard of any capacity.

The illustration shows various sizes of panels and also a total current panel with wattmeter and ammeter for measuring the total station output.

DAILY PRESS COMMENTS ON THE BROOKLYN STRIKE.

New York World.

The failure of the companies to run cars through their inability to obtain workmen would be a strong argument in favor of the employes. The failure to run cars as a result of wire-cutting, or of any other form of lawlessness, relieves the management of responsibility for the obstruction to travel and for the graver consequences that may result therefrom. Nothing in the course of the pending strike has hurt the cause of the trolley employes so much as the violence let loose to aid it.

Syracuse Standard.

With little doubt, the railway companies would admit that they have been controlled by interest rather than sentiment. They would say that they have managed their affairs in accordance with business principles, and ask if any sensible person expected them to do otherwise. Certainly employers will not in general be justified in paying higher wages or extending more privileges than the state of their business warrants; but, on the other hand, they are not justified in pinching and oppressing their employes in order to extract the last dollar which a business can be made to yield.

New York News.

When the truthful history of the Brooklyn strike shall be written it will show that most of the disturbances have grown out of the criminal supineness of the local administration and the extraordinary action of a judge of the Supreme Court in refusing to issue a mandamus clearly within his power and absolutely necessary in order to bring the arrogant men who are in executive control of the street railways to their senses.

New York Tribune.

Their managers do not venture even to assert that they have treated their men justly. They do not seek to answer the charges made against them. They openly declare that it is not in the interest of their stockholders to increase the expenditures of the companies by yielding to any of the demands of their men. That is their only answer. They make no explanations, apologies or excuses. Their stock has been illegally watered, and watered enormously, and they are trying to earn the interest on prodigiously watered bonds and dividends on tremendously inflated stock. No city in this country has ever been cursed with more unscrupulous and objectionable mismanagement of transportation lines than that of the chief trolley lines in Brooklyn.

Pittsburg Dispatch.

For the maintenance of the dignity of the law, all mob violence must be suppressed and street railways protected in the operation of their lines. But with that protection maintained, not the slightest toleration should be extended to failures to afford the full public service for which the companies are chartered. If they are not willing to pay employes enough wages to secure full service, they should be made to bear the penalty. With the protection of the law assured them, they should be given to understand that a failure to keep their accommodations to the public up to the full standard will result in proceedings for the forfeiture of their franchises.

New York Journal.

Great corporations are under obligation to perform their functions and cannot plead for a failure a reason related to the price of labor. They are bound to have the labor, and must pay what it costs. Railroads might as well pretend that an accident, due to defective rails, was excusable because iron was so dear that it was inexpedient to renew the rails till the price of iron should come down. It is the business of the Brooklyn trolley companies to carry the people, and they are bound to any proceeding that is necessary to carry out that contract.

Philadelphia Public Ledger.

The civil power ought to be strong enough to put down riots without calling upon the military so frequently. The mob should be taught to respect the civil authority by stern suppression at the incipiency of an outbreak. If police authorities would act at once, as soon as violence has manifested itself—if they would proceed with the fearless decision which the firemen exhibit in fighting a conflagration—the occasions would be rare when the presence of the military would be necessary. The difference between the Brooklyn railways and their employes cannot be adjusted in an atmosphere of anarchy. That atmosphere must be purified and clarified by the complete restoration of law and order. To temporize with mobs is to further weaken the public respect for law, to widen and deepen the mob spirit and invite other outbreaks on slighter pretexts.

New York Times.

Attacking person and property, interfering with the operation of railroads, and raising riot in the streets are criminal violations of law and an offense against the community. They should be put down and punished, without inquiring how or why they started. It is not a question of the rights and obligations of corporations, or the wrongs of workingmen, and it makes no difference whether there is a labor "strike" going on or not. It is simply a question of maintaining law and order and submission to public authority Until that is done there is nothing else to be inquired into.

Boston Herald.

The complication has assumed a form in which it is not a case for coaxing, or for settlement by mediation. The essential thing is first of all to ascertain whether there is a class there who can defy law with impunity. If it can be established that this may be done successfully, or even if the strike shall be ended on terms which leave it in doubt as to whether law has prevailed through the force of its own majesty, an injury has been inflicted on the safety of society. We cannot afford to have a doubt as regards this if government by law is to be a success in the great cities of the land. It is such a condition of affairs that makes the situation in Brooklyn of national importance, and one that has immediate concern for all who have regard for the maintenance of the American form of government. We cannot allow that to be lost locally which was saved at such a cost in its national character.

New York Herald.

When all violence is put down and peace restored it will then be in order to consider the settlement of the strike and the question of responsibility for its disastrous consequences to the business of Brooklyn. Whether right or wrong in the stand they have taken, the roads are entitled to protection against mob violence and lawlessness. When this protection is given them by the public authorities they will be bound as common carriers either to operate all their lines without delay or forfeit the right to their charters.

New York Evening Post.

"Stop the nonsense," make the streets again safe, enable the companies to assure new men protection from violence, and then, if they cannot secure men, take the controversy into the courts, and find out what their obligations as public carriers require them to do. Until order is everywhere restored, discussion of all other questions should be suspended.

Boston Traveller.

Knowing what street railway companies are, one cannot refuse sympathy to their employes, but must condemn, in toto, their methods. So one must disapprove the temporizing policy of the government. Napoleon never had but one mob to encounter. The lesson he taught that one was conclusive.

New York Sun.

When the trolley men deliberately put themselves into the condition of asking charity, they were their own masters. An appeal for money to help them carry on their devilish determination to keep other men from working in their places, and to maintain a situation in which the people of Brooklyn have their street cars stopped, and the men and money of Brooklyn and of the State of New York are called on to preserve the elementary rules of order and public convenience, is a gross abuse of the charitable impulse. The denunciation of non-strikers seeking work as "outcasts" is an inadmissable outrage. Neither sympathy nor toleration can be given to those who would play football with the sacred principle of equal rights.

Brooklyn Eagle.

Government knows nothing of the disputes and divisions of the labor question, except as that situation forces itself on the community. The issue of order against disorder, of the right to life as against the wrong to kill, and of the right of safety, both of person and property, as against the wrong of the attempted destruction of either, will be met whenever it is raised. Brooklyn has been slow in asserting these principles. All may be sure, however, that Brooklyn will maintain them to the fullness of the meaning and duty of them.

Brooklyn Eagle.

The functionaries who have vibrated with their own fears or who have played to the galleries in this emergency of order will find their short popularity with the lawless or with the maudlin a small offset to the long offense they have given to the influences that dominate thought and action in Brooklyn. To entertain propositions to punish companies for the acts of mobs, or to take away their charters because of the acts of mobs, is a reversal of reason which carries in it a note of demagogy and weakness that will not be forgotten by a city that resents and remembers well.

Matthew Marshall in the New York Sun.

Whatever may have been the grievances of the strikers, and however unjustly they may have been treated, society cannot, consistently with its own self-preservation, permit them and their allies to redress those grievances and secure justice by the means to which they have resorted. The progress of civilization for the last thousand years has been in the direction of taking away from individuals the forcible righting of their wrongs and vesting it in courts and in legislatures. In these closing years of the nineteenth century a reversion to the methods of the dark ages is unendurable.

Pittsburgh Post,

At the outset of the trouble the strikers had the sympathies of the people, as their demands were moderate and they offered to submit to the arbitration of a committee to be named by the mayor, but the street car companies refused. The lawlessness, destruction of property and revolution in the business of the city consequent on the strike have brought to the front the paramount question of maintaining the laws and public order. As usual, and it is the inevitable outcome when this issue is presented; the strikers lose the good will of the public, and, regardless of the rights or wrongs of the original contention, the demand is to put down all lawlessness and operate the roads at any cost if men can be secured to do the work.

New York Press.

These corporations were created for the special purpose of acting as common carriers. They must fulfill their mission or surrender the enormously valuable franchises which have been conferred upon them. This is sound law and sound logic, and Mayor Schieren will be supported in enforcing it to the letter.

Chicago Herald.

As a result, Brooklyn is in a state of absolute anarchy. The mayor, police and aldermen are in open sympathy with the strikers, say so freely, and show it in not trying to suppress the strike. Troops have been called out, but they appear unable or unwilling to do anything. The mob is in control throughout the city. The whole city is idle, working men and women suffering worse than anybody else, because they cannot get to their offices, stores and shops.

CANADIAN NOTES.

(From our Special Ottawa Correspondent.)

Petersborough, Ont.—The Petersborough & Chemong Park Railway Company is applying to the Ontario legislature for power to build an electric railway from Petersborough to Chemong Park. The capital is $100,000.

St. Thomas, Ont.—The St. Thomas Radial Electric Railway Company is applying to the Ontario Legislature for a charter to construct a line of electric railway from St. Thomas to the villages of Union, Sparta, Port Bruce, Port Stanley, Fingal, Wallacetown, Dutton, Bismarck, Rodney, Aylmer and Port Burwell.

Montreal, Que.—The Dominion Government has decided that the Grand Trunk Railway must allow the Street Railway Company to cross its tracks at St. Etienne street, the latter to bear the cost of making the crossings, establishing gates and semaphores, etc., while the Grand Trunk must pay the men who guard the gates.

Hamilton, Ont.—The Hamilton Valley City and Waterloo Railway is applying to the Ontario Legislature for a charter with power to construct an electric railway from Hamilton to Waterloo, Dundas and Guelph.

FINANCIAL NOTES.

Receivership Denied in Trenton. — Chancellor McGill has denied the application of Samuel K. Wilson for a receiver for the Trenton Passenger Railway Company, of Trenton, N. J.

Change of Name.—The New York Railroad Commission has authorized the Port Richmond and Prohibition Park Electric Railroad Company to change its name to the Staten Island Traction Company.

Stock Issue in Baltimore.—The stockholders of the City and Suburban Railway Company have decided to increase the capital stock of the company 20,000 shares. This at $50 per share will yield $1,000,000, and increase the stock indebtedness that amount. The present capitalization is 60,000 shares or $3,000,000. The money raised by the additional stock will be used to pay for the Lake Roland elevated.

New Directors in Milwaukee.—The stockholders of the Milwaukee Steeet Railway Company have elected the following Directors: W. N. Cromwell, C. A. Spofford, A. Marcus, C. W. Wetmore, Geo. H. Sheldon and S. W. Burt, all of New York, and H. C. Payne, Frank G. Bigelow and Charles F. Pfister, of Milwaukee. The addition of Messrs. Pfister and Bigelow to the Board is the first step toward making Milwaukee the financial headquarters of the company.

Charters to be Surrendered.—The incorporators of the Lancaster & Manheim, Lancaster & Lititz, Lancaster & Middletown, Lancaster & Strasburg, and Conestoga Valley Electric Railway companies met in Lancaster last week and took the preliminary steps for having their charters dissolved. These were taken out several years ago, but no steps were taken toward building the lines of road. Other companies have got in ahead of several of these and are now building lines, or are about beginning work.

New West End Bonds.—The West End Street Railway Company, of Boston, has filed a petition with the Railroad Commissioners asking for an approval of an issue of $2,275,000 new bonds. The company has coming due shortly a large amount of bonds of the old Metropolitan and Highland street railways, and it is for the purpose of taking these old bonds up, and also to pay off outstanding mortgages on property owned by the company in different parts of the city, that the issue is requested.

Change in Ownership in Toledo.—The ownership of the Toledo, Perrysburg & Maumee Electric Railroad has been changed. The Hon. Parks Foster and Burton Foster have retired from the company as president and manager respectively. The members of the new company are H. C. Ellis, Harry King, Thomas Tracey, A. K. Detwiler and W. B. Taylor. Mr. Ellis will be general manager of the road hereafter. The Fosters will go to Elyria, where they will enter into the construction of the new electric road from that place to Oberlin, and will occupy positions similar to the ones they held on the Toledo, Perrysburg & Maumee road.

Sale of the Sioux City Elevated.—February 23 has been fixed as the date for the sale of the elevated road of Sioux City, Ia. By the terms of the judgment the sale will be made without right of redemption, in order that the purchasers may immediately organize a new company to operate the road without danger of the property being afterward redeemed by the original owner or any of the other creditors. The bondholders have practically decided to bid in the property for the amount of their claim, and after paying off the $70,000 or $80,000 of secured liens, to continue the operation of the road through a company of their own, which they will organize for the purpose.

Baltimore Street Railway Traffic.—The payments of park taxes by street railway companies indicate that in 1894 about 55,000,000 passengers were carried. The City Passenger Railway had gross receipts of $998,140.10 and carried 19,962,802 passengers, estimating, as in the case of the other lines, that all paid five cents fare. The Traction Company is shown to have had gross receipts of $705,027, and carried 14,100,540 passengers. Next comes the City and Suburban with gross receipts of $451,488, and carrying 9,029,760 passengers. The Central apparently had $186,194.30 gross receipts, and carried 3,723,886 passengers. Lastly, the Lake Roland had $148,650.80 gross income, and conveyed 2,973,016 passengers.

Peoria, Ill., Receivership.—The Fort Clark Street Railway Company, of Peoria, Ill., passed into the hands of a receiver last week on application of the Illinois Trust and Savings Bank, of Chicago, the holder of its bonds. F. W. Horne, of Chicago, the president of the company, was appointed receiver by Judge Worthington in bonds of $20,000. The company was managed by local capitalists for many years, but went into other hands in 1892, it being understood that the General Electric Company was the purchaser. Since then it has suffered from the hard times, the expense of electrical equipment and paving made necessary by city improvements. The Illinois Trust and Savings Bank applied for the receiver as the holder of $250,000 of the gold bonds of the company, payment of the interest on which has been defaulted. The receiver will operate the road.

Annual Report of Washington (D. C.) Roads—The annual report of the Metropolitan Railroad Company of Washington, D. C., has been submitted to the House for the year ending June 30 last. The passenger receipts for the year were $348,511.53. The company paid $58,600.50 in dividends and $119,172.63 wages of drivers and conductors. The total receipts, including the balance on hand July 1, 1893, were $475,215.15. The balance on hand June 30, 1894, was $12,128.32. The annual report of the Eckington & Soldiers' Home Railway Company for year ending Dec. 31 shows the total receipts to have been $313,733.56. The balance on hand was $9,169.90. The total number of revenue passengers carried were 1,804,915, and the revenue derived therefrom $78,922.65. The annual report of the Belt Railway Company for the year ending Dec. 31 shows total receipts of $261,357.58. The total number of revenue passengers carried were 2,949,656, and the receipts therefrom $132,563.70.

National Railway Co.'s Meeting.—The annual meeting of the National Railway Company, of Chicago, which controls the Cass Avenue and Fair Grounds Railway Company and St. Louis Railway Company, of St. Louis, was held in Chicago last week. President Hamilton, after stating that the year 1894 was a trying one for his company because of the general depression in all lines of business, read his report, which showed that the company earned 8.94 per cent. on its stock, against 9 per cent. in 1893, 10 per cent. in 1892, and 8.5 cent. in 1891. The gross earnings of the cable line were $880,663, and $472,473 for the electric lines. The percentage of operating expenses was 57.17 per cent. for the cable lines and 57.77 per cent. for the electric lines, the average being 57.39 per cent., against 60.13 per cent. in 1893. The cost of operating by cable was 7.04 cents per car mile, and the cost of operating by electricity was 8.06 per car mile. The company has 43 miles now operated by electricity, and will soon add 14 miles, making the total 57 miles. There were represented at the meeting 17,516 shares out of a possible 25,000 shares. Dividends were paid last year amounting to 7 per cent.

Sale of the Ottawa (Ill.) Railway.—The General Electric Company has sold the Ottawa Electric Street Railway to an Ottawa syndicate, represented by Mayor Schoch, for $40,000 in bonds, the condition of the contract requiring the local men to invest $20,000 additional in improvements. The property will be transferred March 1. This purchase is the result of the war waged between the city and the road for the past three years. The road originally cost $115,000, and was the first electric road put down in Illinois. During the making of street improvements three years ago it was greatly hampered by its tracks being torn up, and sued the city for $50,000 damages. This case was settled, but a reduction of wages was followed by a strike, which angered the labor unions, and as a consequence greatly reduced the number of passengers. The management refused to make any improvements whatever, and has allowed the property to be so badly crippled for lack of repairs that it has for a year hardly paid operating expenses. The new management will place it upon a paying basis immediately upon taking possession, and lay out a pleasure park, besides making needed improvements.

Alley L. Chicago Finances.—At the annual meeting of the Chicago & South Side Rapid Transit Company of Chicago, a financial report was submitted which was in every way discouraging. The deficit for the year was $381,876. The total earnings were $711,684.51; the total expenses $568,561.08; net operating earnings, $143,123.43; interest on bonded debt, $525,000. The following figures relating to traffic operations were given: Train mileage (passenger cars), 1,229,957; car mileage (passenger cars), 5,182,598; number of passengers carried, 13,587,791; average cost per passenger, $.0419; operating expenses, per train mile, $.462; operating expenses, per car mile, $.109. In his annual report President Hopkins said: "It is my opinion that the ultimate success of the Union Elevated Railroad Company, in procuring the necessary consents and in obtaining the necessary ordinance and in the construction of its elevated loop railroad, is a certainty, and I have every confidence that when said elevated loop railroad is constructed and your company has the use of the same, as it will have under the aforesaid contract, the traffic of your railroad will show a most gratifying increase." Mr. Hopkins gave a synopsis of the average travel, showing that in August the daily number of passengers carried was 31,029, which gradually increased so that in December it was 43,276, while for the current month it has fallen back to an average of 40,438 per diem.

NEW INCORPORATIONS.

Wellston, O.—The Jackson, Wellston & McArthur Railway Company has been incorporated with a capital stock of $10,000. The promoters are: Isaac E. Adams, Daniel J. Ryan, Edwin R. Sharpe, Chas. Kinney, Edward B. McCarter.

New York, N. Y.—Articles of incorporation of the People's Traction Company, of New York, have been filed. The object of the company is the construction and operation of surface railroads in the annexed district of New York City. The railroad is to be 20½ miles in length.

Washington, D. C.—Mr. Turpin, of Alabama, has introduced a bill in the House to incorporate the Washington & Brighton Railway Company. The incorporators are Horatio Browning, Clarence F. Norment, Levi Woodbury, Wm. B. Webb, F. P. May and R. F. Baker. The company proposes to operate an electric railway between Washington and Chesapeake Bay.

White Plains, N. Y.—The Westchester County Central Electrical Railway Company has been incorporated, with a capital of $75,000, to build and operate a street surface railroad three miles in length in the Village of White Plains and to Silver Lake Park, in the town of Harrison. The Directors are: Charles A. Johnson, Frederick H. Reed, George N. McKibbin, Charles M. Nichols, Lloyd McK. Garrison, of New York City; S. H. Gainsburg, E. C. Sniffin, and J. Henry Carpenter, of White Plains, and George W. Mansfield, of South Norwalk, Conn.

Hackensack, N. J.—The National Trolley Company has filed articles of incorporation in the County Clerk's office of Bergen County, N. J. The capital stock is $50,000. Ex-Assemblyman Delos Culver, of Jersey City, is the president of the company. The company will operate under the charter of the New Jersey & New York Bridge Company, and proposes to build electric roads between Fort Lee and Englewood, and the latter place and Hackensack. The Bergen County Traction Company have plans to establish trolley roads over the the same route, and there may be a conflict between the two companies. Some time ago Mr. Culver established a trolley company to build a road between Rutherford and Carlstadt. There was another company at the time building a road over this route. A conflict was avoided by Mr. Culver being made a director of the other company. He disbanded his company.

NEWS OF THE WEEK.

Albany, N. Y.—It is announced that the reconstruction of an electric railway connecting Albany with New Scotland, Thompson's Lake and Schoharie is probably assured.

Chicago, Ill.—The Metropolitan West Side Elevated Railway Company ran a train of a dozen cars over the line to the eastern terminus near the river last week. An ordinary steam locomotive was used, as the electric motors are not ready.

Brooklyn, N. Y.—General Manager Gcundie, of the Kings County Elevated road, issued a statement to his employes last week announcing that the regular pay of all the men whose salaries had been reduced last year would be increased 10 per cent. in addition to the 25 per cent. they have received for working overtime during the strike. The increase takes effect between Jan. 16 and 31, and will be continued after the 31st, if the road's business warrants it.

Detroit, Mich.—The city of Detroit has been defeated in its controversy with the Detroit Citizens' Street Railway Company. Last October the city was beaten in the United States Court of Appeals at Cincinnati on the merits of the case. Mayor Pingree tried to have Attorney-General Ellis commence quo warranto proceedings against the company. The latter refused to do so, whereupon the city asked the Supreme Court for a mandamus to compel him to act. The court has denied the mandamus in an opinion in which the decision of the Court of Appeals is held to be final. The street railway company's contention that its franchise is good until 1909 is sustained.

Philadelphia, Pa.—Common Councilman Dixon has presented an ordinance regulating the speed of trolley cars. The ordinance makes it unlawful to propel a car faster than seven miles an hour in the built-up portion of the city and 10 miles an hour in the suburban districts. It provides that a fine of $10 be imposed on any motorman, conductor or agent who shall cause a car to be run in excess of this rate of speed, and, in case of default in the payment of fine, holds the company employing the offenders liable.

Tyler, Tex.—An electric railway is talked of New Orleans capitalists are interested in the enterprise.

Orange, N. J.—Watson Whittlesey, receiver of the Suburban Traction Company, has obtained the permission of the court to equip the East Orange and Bloomfield line with the trolley system.

Albany, N. Y.—Assemblyman Wilcox, of Cayuga, has introduced a bill providing that cable and electric cars be vestibuled during the months of November, December, January, February and March.

Corsicana, Tex.—An Eastern syndicate has made the citizens a proposition through Capt. J. A. Townsend to construct an electrical railway here at a cost of $15,000, providing liberal franchises may be had.

Harrisburg, Pa.—Among the bills introduced in the House is one authorizing street railway companies and traction motor companies and lessees of any street railway company to carry freight and collect compensation therefor.

New York, N. Y.—The Staten Island Rapid Transit Railroad Company has under consideration the advisibility of changing the motive power of its road to electricity, making a trolley line of it. It is proposed to run branch lines from the main line into the interior of the island from all the principal stations.

Detroit, Mich.—The Wayne Circuit Court has handed down a decision against the Citizen's Street Railway Company in its petition for a temporary injunction to restrain the Detroit Railway Company from proceeding with the construction of its lines under the ordinance granted by the Common Council.

Denver, Col.—A boiler in the Denver Tramway Company's Lawrence street power-house exploded Wednesday night, killing two men outright and injuring a number of others. The exploded boiler was blown over 500 ft., and the force of the explosion wrecked the entire building, destroying property valued at $100,000.

Boston, Mass.—It is rumored that the G. A. Lancaster Elevated Railway Company will ask for a charter. It is proposed to build a road to cost about $2,000,000. It will be constructed upon single columns, and the roadbed will be on a level with the second story of business buildings. Electricity will be the motive power.

Philadelphia, Pa.—The Philadelphia, Cheltenham and Jenkintown Electric Railway, on Old York road, which is to be operated by the People's Traction Company, has plans prepared for a handsome power station, to be built at Ogontz, and estimates for its construction are being received from contractors. It will have a capacity of 2,500 H. P.

Chicago, Ill.—Attorney Grinnell of the Chicago City Railway, has deposited with City Comptroller Jones $10,000 for that company. This is the first of a series of ten annual payments of the same amount, in accordance with the requirements of the ordinance passed by the Council July 16, 1894, which gives the company the right and authority to change the motive power on many of its South Side lines from horse to electric power.

Lancaster, Pa.—Residents of Strasburg recently held a meeting for the purpose of aiding in the construction of the Lancaster & Strasburg Electric Railway, and $10,000 in stock was subscribed toward the proposed line. Among those interested in the project are C. W. Breuninger, Jacob Hildebrand, George W. Haffel, J. E. Herr, A. M. Herr, B. B. Gontner, J. F. Ingram, B. W. Zook, and E. C. Musselman.

Oshkosh, Wis.—The Central Wisconsin Electric Railway Company has been organized for the purpose of building an electric street line in this city and an interurban road between Oshkosh and Kaukauna. The following directors were chosen: G. H. Kedham, G. J. Kobusch, Otto Von Schrader, F. M. Ohl, T. E. Ryan, C. T. Leurs and M. L. Campbell. The capital stock is $1,000,000. It is predicted both roads will be in operation by June 15.

Manchester, N. H.—A bill has been introduced in the Legislature to incorporate the City & Suburban Electric Railroad Company. The incorporators are John C. Ray, O. D. Knox, Fred T. Dunlap, C. E. Greene, William A. Truesdale, J. F. Baldwin, Charles E. Cox, Edgar J. Knowlton, Roger G. Sullivan, John W. Mears, William Marcotte, J. B. Esty, Charles C. Hayes, Horatio Fradd, Samuel M. Mead, George I. McAllister and Frank M. Preston.

Berlin Iron Bridge Company.—The annual meeting of the stockholders of the Berlin Iron Bridge Company was held at the office of the company, at East Berlin, Conn., on Tuesday, January 29. The following Board of Directors was elected: Chas. M. Jarvis, Geo. H. Sage, F. L. Wilcox and Burr K. Field, of Berlin, Conn., S. Howard Wilcox, of Brooklyn, N. Y., Julius Burr, of East Berlin, Conn., and H. Peck, of Waterbury, Conn. By vote of the stockholders, the capital stock of the company was increased from $300,000 to $500,000. The new issue of stock has all been taken by the old stockholders.

PERSONALS.

Mr. E. Mitchell Cornell, Ex-President of the Chester (Pa.) Street Railway Company, died on January 18th.

Mr. F. L. Hart has been appointed chief engineer and general manager of the Baltimore City Passenger Railroad Company, to succeed Mr. A. N. Connett, who resigned several months ago to accept the position of chief engineer of the Metropolitan Railroad Company of Washington.

TRADE NOTES.

The Berlin Iron Bridge Co., of East Berlin, Conn., has closed its purchasing agent's office in Philadelphia, and hereafter all purchases will be made from the office of the company at East Berlin, Conn. Mr. W. E. Stearns, who has lately occupied the position of purchasing agent, has severed his connection with the company and accepted an important position with the Pennsylvania Steel Co.

Sperry Electric Railway Apparatus.—W. B. Brennan, superintendent of the Chicago General Railway Company, in a recent letter to the Sperry Electric Railway Company, of Cleveland, O., says: "Your electric brake which is attached to our new cars with new style Sperry controller is creating a 'furore' in the electric railway world in Chicago. There isn't a day but men connected with the electric railways come here to examine your brake."

The Abendroth & Root Manufacturing Company, 28 Cliff street, New York City, sole makers of the Root improved water-tube boiler and Root's spiral riveted pipe, find business good, and state that the outlook for the ensuing year is excellent. There has been a lively demand for the boiler from the South and West for service in electric lighting and electric street railway plants. This is a class of work for which the Root boiler is especially well adapted, and for which it has become deservedly popular.

Piper-Burrowes Patent Litigation.—The interference proceeding which has been pending in the Patent Office for several months between E. E. Piper, Treasurer of the Davis Car Shade Company, and E. T. Burrowes, President of the E. T. Burrowes Company (manufacturers of the Burrowes Car Shade), both of Portland, Me., was finally settled by the Commissioner of Patents, Jan. 11, in favor of Mr. Piper. In his decision the Commissioner rules that the Burrowes claims are not patentable. This dissolves the interference and settles the suit. S. W. Bates, of Portland, and Marcellus Bailey, of Washington, appeared for Mr. Piper, and L. S. Bacon, of Washington, for Burrowes.

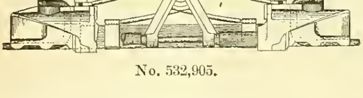
Berlin Iron Bridge Company's New Contracts.—The Middletown & Goshen Traction Company, at Middletown, N. Y., has placed a contract for a new car barn with the Berlin Iron Bridge Company, of East Berlin, Conn. The same parties have a contract for the iron roof over the new oxide shed for the Brookline Gas Light Company, at Allston, Mass. The new power station for the United Electric Light & Power Company, of New York, N. Y., is now being put in place by the Berlin Iron Bridge Company. This will be one of the largest and most complete plants in the United States. The engine and dynamo room is 100 ft. square and the boiler room is 60 ft. by 100 ft. The engine and dynamo room is to be covered with the Berlin Iron Bridge Company's patent anti-condensation corrugated iron. The coal pockets over the boiler room will have a capacity of 3,000 tons of coal.

RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued Jan. 22, 1895.

532,748. Bracket Clamp; Augusta A. Ball, Jr., Schenectady, N. Y., Assignor to the Thomson-Houston Electric Company, Boston, Mass. Filed Oct., 18, 1894. Washers are adapted to partially conform to the shape of the pole. Bolts embrace the pole, the washers and the bracket, each bolt having its threaded end passed through the eye of the other.

532,796. Electrical Conductor; Edward D. Lewis, Savona, N. Y., Assignor of two-thirds to Fred S. Lewis, Lewis H. Hill, Adelbert D. Dusinberre, Horatio S. Johnson, Charles A. Van Housen and Charles W. Gillmer, same place. Filed June 16, 1894. The conductor has a flexible insulating strip embracing and hugging it on three sides, the fourth side being exposed to make electrical contact with the contact wheel.



No. 532,905.

532,804. Automatic Switch-throw for Street Railways; Frank F. Moore, Atlanta, Ga. Filed March 27, 1894. A throw is pivoted to the bed-plate and frog, the corners of the throw entering grooves in the side of the rails.

532,812. Trolley-Wheel. Benjamin O. Paine, Millbury, Mass. Filed June 11, 1894. In a trolley for electric cars the downwardly offset axle-bar journaled at its ends is arranged to swing or oscillate in the bearing fork. The bearing-fork and a trolley-wheel are mounted to rotate about a bearing on the axle-bar, the axis of the trolley-wheel being lower than the axis of the axle bar bearings.

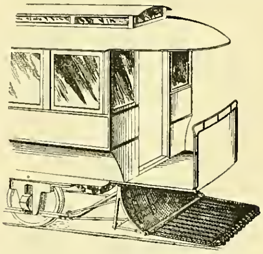
532,889. Brake for Railway-Cars. Charles Matthews, Turtle Creek, assignor to John R. Cutshall and Calvin G. Kelley, Dravosburg, and Murray McC. Ramaley, Turtle Creek, Pa. Filed Jan. 15, 1891. The brake shoe is supported from the truck by arms and casings, each arm being provided with a cam, which is pivoted to the casing suitable means to operate the arm being provided.

532,905. Trolley-Breaker. William B. Potter, Schenectady, N. Y., assignor to the General Electric Company, Boston, Mass. Filed Aug. 4, 1891. This is a line section insulator, with a central bar of insulating material forming a runway for the trolley. The side bars are of magnetic material, metallic end pieces connecting the bars together, but insulated therefrom. An iron yoke connects the outer magnetic bars together and coils upon the yoke are connected at one end to the metallic end pieces of the trolley breaker. At the other end to the auxiliary terminals upon the insulating bars, whereby upon the passage of the trolley the current passes around the coil and energizes the yoke and the side bars to form a magnetic field adapted to blow out the arc following the trolley. (See illustration.)

532,951. Car-fender; William L. Fess, Avonmore, Pa., assignor to himself and Charles Andrew Hill, same place. Filed Sept. 1, 1891. The fender is adapted for attachment to the body of a car, and is provided with a spring-controlled shoe pivotally connected with the body and capable of being depressed. A rock shaft is mounted on the lower end of the body, and has one arm connected with the shoe. A foot lever is adapted to be fulcrumed upon the platform of the car, the lever being connected with the other arm of the rock shaft.

532,968. Device for Sanding Tracks; John J. Kennelly, New York, N. Y., assignor of one-half to John B. Benton, same place. Filed April 11, 1891. The device comprises a hopper for the sand, an oscillating or rocking valve arranged under said hopper and having opposite inlet and outlet ports, means for rocking the valve, and a delivery tube fixed to and moving with the valve, whereby the tube is held up out of the way when not delivering sand.

532,992. Car-Fender; Adelbert L. Reynolds and David A. Center, New York, N. Y. Filed March 3, 1894. An inclined guide is rigidly supported from the truck frame and a fender frame comprising triangular standards is pivoted on the under side of the car, crossbars connecting the standards with each other and one traveling on the inclined guide. A fender platform is held adjustable on the crossbars of the standards, and means are provided for locking the fender platform on the standard crossbars. (See illustration.)



No. 532,992.

532,020. Cable-Grip; Michael F. Robinson, New York, N. Y., assignor of one-third to Thomas J. Healey, same place. Filed Aug. 22. 1894. The gripping jaws are adapted to move to and from one another, having the faces of their fixed portions undulating. Each jaw is provided with a friction roller opposite the depressed surface of the opposing jaw.

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Views from the Rear Platform.

The Brooklyn Board of Aldermen has been engaged of late in investigating the operation of electric cars in that city and a vast deal of testimony has been taken. No special qualifications seem to have been required of witnesses ; any one who wanted to say anything upon the subject or to criticise the management of the several roads was given an opportunity to air his views. The strike was not touched upon, as evidently the aldermen desire to reserve to themselves, so far as possible, the privilege of talking nonsense publicly on this subject. As no special knowledge of trolley car operation was considered essential in witnesses, it is not to be wondered at that the proceedings are scarcely worthy of extended report. The views of one witness, however, are interesting, as they are based on the result of ten years' experience and observation on the rear platform. When this conductor was asked his opinion as to the best means of avoiding accidents, he replied that a reduction of speed would be an important remedy, and he presented for the committee's consideration a schedule showing the speeds attained on 21 different roads in Brooklyn. These ranged from 6.6 to 10.6 miles per hour; in most of the cases the rate was between seven and eight miles. When the stops were frequent the witness estimated that it was necessary, in order to conform with the schedule, to operate cars at from 12 to 15 miles an hour; and this speed, his experience had convinced him, was dangerous. It was evident that the conductor deemed it unsafe to run cars faster than 10 miles an hour, though, if a rule to this effect was strictly enforced in Brooklyn, the companies would be overwhelmed with complaints from indignant passengers who are always in a hurry. The practice of allowing passengers to ride on the front platform tended, the witness thought, to increase accidents, as these persons interfered with the work of the motorman by continually crowding up against him and by persistently talking to him. This view is unquestionably correct, and street railway managers are all inclining to the belief that the front platform should belong not to smokers, but to the motorman. as exclusively as the cab to the locomotive engineer. Of fenders the witness had an extremely poor opinion, and it is not surprising, as his street railway experience was gained wholly in Brooklyn. The type of fender in use there is useless, if not worse than useless, as a protection to life and limb. If his observation had not been so limited, perhaps his condemnation would not have been so sweeping. for there are useful fenders. When asked by one of the committee if he did not think that cars should come very nearly to a stop when approaching each other, the witness very sensibly replied in the negative, as he realized that such a practice would be out of the question on streets where cars are passing every fraction of a minute. It is interesting to note that the witness favored stopping at the near crossings as a means of decreasing accidents, and he believed in limiting the number of passengers, presumably for the reason that the conductor would then be freer to move about and would not be detained for so long a time in collecting fares. Most of these views are practical and based on common-sense, and it is interesting to note that they are not greatly at variance with those entertained in the manager's office.

End of the Brooklyn Strike.

It is now estimated that the Brooklyn strike has cost that city $3,000,000, though, if all the figures were obtainable, the aggregate would undoubtedly be much greater, and the end is not yet. The city is still losing money and quiet has not been restored. The citizens have commenced to ask how long this sort of thing is to last, but the authorities seem unable to furnish a satisfactory answer. They are not yet as earnest as they should be in dealing with the lawless element. So far as the companies are concerned the strike is at an end. and has been, in fact, for ten days or more. They have employees enough to man their cars, and it appears from reliable statements that nearly as many cars are now in operation as before the strike. The number, in fact, is more than enough to accommodate the travelling public, for citizens are not yet inclined to ride in cars that are likely to be stoned at almost any time or place. The service is not yet as good as it once was. but that is not to be expected. During the exciting events of the last few weeks discipline could not be maintained effectually, rules could not be rigidly enforced in the case of men constantly assaulted, and schedule time could not be hoped for when lawlessness in various forms occasioned almost hourly delays. Even when the men are no longer in danger of molestation. and when disturbance entirely subsides, a period must elapse before the employees are thoroughly trained in their new positions, the incompetents weeded out, and the necessary work of reorganization thoroughly completed.

While the strike is ended, so far as filling positions is concerned, the leaders of the former employees and their sympathizers, do not seem so to regard it. The men on the cars are still the victims of brutal and cowardly assault, and the cutting of wires is still the cause of some delay. Legal attacks are prosecuted with a great show of earnestness, but nothing is expected to come of them, and of what avail can they be to the misguided men who have lost their places? The strike leaders simply follow this course, apparently to bluff their blind followers into the belief that the strike is not over. Such a policy is sheer wickedness; if, when it was seen that the strike had failed in its purpose. it had been abandoned. and the men had been left free to seek their old positions, some two or three thousand of them at least, who are now out of employment, might have been provided for. How they are now to live through the winter, without seeking the aid of the charitable, it is hard to see. It is a discouraging fact that men will persist in following the leadership of such self-seeking demagogues as those who have managed the Brooklyn strike. Had they been loyal to their followers. the strike leaders would have capitulated two weeks ago, when something could have been gained by surrender. They preferred, however, in their wisdom, to keep up the struggle as long as the money should last, but when that is gone they will cheerfully leave the men to their fate. That, in their opinion, will be the end of the strike.

FENDER REGULATIONS IN WASHINGTON.

The District Commissioners of Washington, D. C., who have had the fender question under consideration, last week issued a formal regulation on this subject. It is provided that on and after the first day of April, 1895, every grip and motor car operated in the district shall be fully equipped with front pick-up fenders of the Blackistone pattern. A provision is embraced in the order that any company may substitute in place of the Blackistone fender any other device which may hereafter be approved by the Commissioners. It is also provided that every car shall, at the same time, be eqiupped with wheel guard fenders of the Brightwood automatic pattern, the Blackistone pattern, or the Eldridge pattern, in place of which any other devices subsequently approved by the Commissioners may be substituted.

The penalty for failure to comply with the provisions of the order is a fine of $25 a day for each car not thus fully equipped and operated by the respective companies. It is also provided that companies operating cars requiring fenders shall, after 30 days' notice from the Commissioners, remove from its tracks all permanent obstructions projecting above the general surface of the pavement which prevent the satisfactory action of the wheel guard fender or increase the danger to life and limb. Any company failing to comply with this requirement is liable to a fine of $5 a day for each obstruction not so removed upon and after the date specified.

It is further provided that all cars included in the order shall be so constructed or altered that a clear space of 15 inches in height above the rails is maintained between the wheel guard and the adjacent end of the car, in order to allow the effective action of the wheel guard. A fine of $5 a day for each car not so constructed is provided. The closing paragraph of the order provides that after the fenders are placed on the cars they must be kept in working order and in good repair at all times during the use of such cars, any railroad company failing to comply with this provision being subject to a fine of $20 a day for each and every offence.

COUPON TICKETS IN VINCENNES, IND.

The Citizens' Street Railway Company of Vincennes, Ind., has adopted the book ticket system to encourage riding on its cars. The price for a single book containing 100 tickets is $4.25, three books $12, five books $18, ten books $25. The tickets when sold in this way are not transferable, but it is not required that all the books shall be issued in the one name; several persons may club together and purchase tickets at the reduced rate. The company in order to stimulate the rapid use of tickets gives a rebate on the return of the cover of the book, the amount varying according to the period that the book has been issued. If it is presented within 30 days the rebate is 75 cents; within 60 days, 50 cents; within 90 days, 25 cents.

LEWIS & FOWLER RECEIVERSHIP.

Francis N. Ross, owner of 60 shares of the capital stock of the Lewis & Fowler Manufacturing Company, of Brooklyn, now in the hands of a receiver, has addressed to the district attorney of King's County a petition asking him to call the attention of the grand jury to the financial affairs of that company. Mr. Ross alleges that the business of the company has not been managed as it should have been, and that the officers are to blame for the financial condition of its affairs and the present necessity of placing it in the hands of a receiver. He declares that the entire capital of the concern, amounting to $290,000, has been absorbed, and that in addition there are liabilities of about $200,000 against it.

Mr. Ross claims that the collapse is practically due to the mismanagement of A. H. Dollard, former president of the company; George M. Myers, its former secretary, and Daniel F. Lewis, now treasurer of the concern. Mr. Ross says that, to his best information and belief, the officers of the company paid dividends when the company was, in fact, insolvent. He alleges, also, that the false reports of the company's financial condition were sent out and to the state treasurer at Albany.

Mr. Ross sets forth as the last report of the company, as filed with the state treasurer in January, 1894, these figures: "The amount of capital stock is $400,000, the capital stock actually issued is $299,750, the amount of debts do not exceed $180,000, the amount of assets is at least $479,000."

He says that to his knowledge the company met with no heavy losses since this report was filed and he cannot see how the company could have failed had that report been correct.

An order has been entered by Judge Gaynor, of Brooklyn, allowing Charles Dobbs, the temporary receiver of the Lewis & Fowler Manufacturing Company, to continue the manufacture of minor appliances for cars.

CABLE MAIL CARS IN CHICAGO.

Mail cars will soon be operated on the Madison street cable line of the West Chicago Street Railroad Company. Mr. Yerkes, president of the company, and Postmaster Hesing, of Chicago, recently talked the matter over, with the result that the former ordered the construction of four combination mail cars, two for winter and two for summer use. The part reserved for the postal department will be absolutely under the control of the local postoffice. Speaking of the new departure Postmaster Hesing said :

> "I am satisfied that, when once in use, the mail cars will prove practical and useful, and when the other cable lines see the benefit of such a service they will follow, and within a short time I expect to see a perfect system of street railway mail cars in operation in Chicago. Long before the new postoffice is erected we will see a mail car start from Rogers Park, coming over the north side electric lines, connecting with the cable lines, and transferring to the south side cable lines, to the electric lines beyond, and carrying the mail to West Pullman and Kensington. All of the first-class mail in the city along those routes can be picked up from stations and carriers and distributed on the mail cars to the respective stations to which it belongs. There is no doubt that this system will work a revolution in the local mail facilities second only to the perfecting of the postal system of Chicago last July."

The Trade and Labor Assembly of Chicago has put itself on record as opposed to the cable mail service. At the meeting last Sunday the organization disapproved of the operation of street railway mail cars on the ground that the street railway companies by introducing them were influenced not by a desire to be of service to the public, but to provide against strikes.

NANTASKET BEACH ELECTRIC LINE.

The announcement that the New York, New Haven & Hartford Railroad Company would equip its Nantasket Beach line for operation by electricity has been confirmed in all particulars. The site for the power house has been selected at Nantastket, and many of the details for the equipment of the line have been decided upon. The projec. contemplates the building of a double track line from Hingham to Hull, work upon which will be started as soon as the plans come from the engineer's office. T-rails will be used, and the same attention to detail will be observed in ballasting the roadbed as is employed on the main tracks of the company. It is announced that everything in connection with the equipment will be of the best quality, while its application will be intrusted to the best experts in the country.

President Charles P. Clark, of New Haven, recently said: "We are going to demonstrate whether electricity is practicable and is with us to stay. We propose placing the motors on our ordinary steam cars, the first trial of the kind, I believe, that has ever been attempted in this country. The results we obtain will largely govern our future policy in relation to other branch lines under our control."

It has been stated that the company intended to acquire a right of way from Hingham to Downer Landing, in order to make a circuit of the beach resorts, but this matter will be left in abeyance for the present. The speed at which the electric cars will be run has been given no little attention. It is believed that the cars may be operated at 30 miles an hour at least. Additional stations are to be built between Nantasket and Hull, the object being to make the line as convenient to residents and excursionists as possible.

It is not proposed to abandon steam altogether, as the occasions will be frequent when heavy trains of excursionists will arrive from interior sections, making a transfer at Hingham not at al desirable.

FENDERS IN PHILADELPHIA.

The Philadelphia Traction Company has decided to equip three of its lines with three different kinds of fenders. The Crawford pick-up fender will be put on the Ridge avenue cars; the Kennedy & Roletta double-end fender, which has been found satisfactory on several trials, on the Chestnut and Walnut street cars, and the Lancaster avenue line will be equipped with a fender like the Sterling, consisting of a shield of wire with a heavy rubber edge fastened to the front of the car, close to the ground. The company is making the last two fenders mentioned at its shops, at Forty-first and Haverford streets.

BROOKLYN ELECTRIC RAILWAYS AND THE GRAND JURY.

The grand jury of Kings County last week made the following presentment regarding the electric railways of Brooklyn:

> First. That there is an alarming increase in the number of accidents under the trolley system of operating the surface railroads of the city of Brooklyn, as compared with the old method of locomotion by horses, and respectfully recommend that the railroad companies be required to change their schedules of the various roads so as to allow sufficient time for ordinary delays and stoppages.
>
> Second. That the speed through the thickly populated parts of the city be limited to eight miles per hour.
>
> Third. That an ordinance be passed by the common council preventing passengers from riding on the front platforms of all surface cars.
>
> Fourth. That a speed indicator be placed in every car, in plain view of the passengers, that will show at what speed the car is running.
>
> Fifth. That the city officials appoint inspectors to see that the speed ordinance is complied with, with power to arrest and bring to justice the violators.
>
> Sixth. That the executive officers of the railroad companies be censured for habitually violating the city ordinance with respect to speed, and that the corporation counsel be requested to see that in future this ordinance is complied with and to prosecute violators.
>
> Seventh. That a board of competent men be appointed by the officials, under whose jurisdiction it would come, to examine applicants for the position of motormen and to license such applicant found fit to perform the duties devolving on motormen, and that none other than licensed men be employed by the railroad companies as such motormen.
>
> Eight. That a practicable fender that will be serviceable in saving life be placed on the cars.

In reference to these recommendations the Brooklyn *Eagle* says:

> Of course, a grand jury has a great deal of power. Its power, however, is not in presentments, but in indictments. This presentment referred to was on railroad matters. Had there been indictments on railroad matters that would have been important. Crimes many in number and terrible in character involving at least two cases of actual murder and a multitude of grave personal injuries as well as the destruction of much property and the creation of a state of war for weeks in large communities of people prevailed here while the grand jury was in session. No indictments for those crimes came out of that body. For such crimes to be ignored and for a presentment to follow is as irrelevant as anything that could be well imagined.

NASSAU ELECTRIC RAILWAY, BROOKLYN.

The construction of the important electric railway system of the Nassau Traction Company, in Brooklyn, is rapidly nearing completion. About 38 miles of track have been laid, and machinery is now being installed in the new power house, Fig. 1, at the foot of Thirty-ninth street. From this point the road will extend to the ferry at the foot of Broadway, and thence to Canarsie on Jamaica Bay.

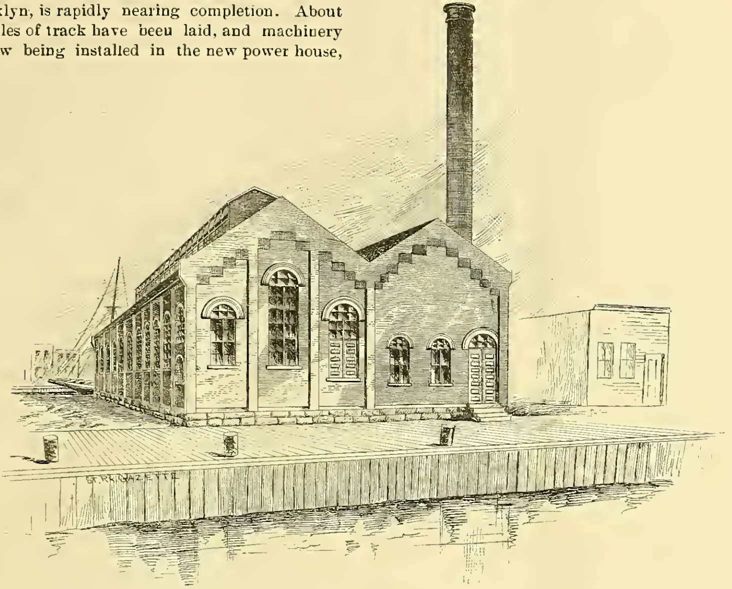
FIG. 1.—POWER HOUSE OF THE NASSAU TRACTION COMPANY, BROOKLYN.

The track construction of the Nassau company is of the most substantial character. Johnson nine-inch girder rails, weighing 93 pounds to the yard, have been laid throughout the system, all the rail joints have been electrically welded, current for this work being supplied from the power station of the Atlantic Avenue Railroad Company. A section of the track representing the electrically-welded joints is shown in Fig. 2.

The overhead work is as substantial as the construction of the roadbed. The trolley, feed and span wires were furnished by the John A. Roeblings' Sons Company and the Washburn & Moen Company. The insulators were supplied by the H. W. Johns Manufacturing Company.

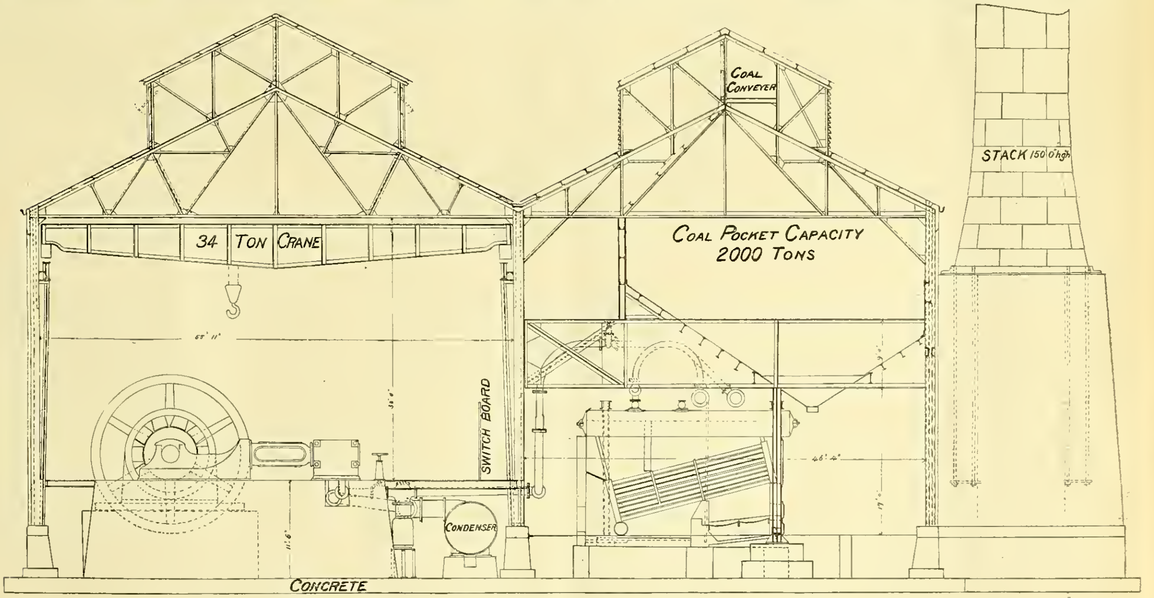

FIG. 3.—SECTIONAL ELEVATION OF THE POWER HOUSE OF THE NASSAU TRACTION COMPANY.

The cars which will be used are unusually handsome in design and were designed by the John Stephenson Company. The bodies are 20 feet long, and are mounted on Dupont trucks, manufactured by the Johnson Company, of Johnstown, Pa. Each car is equipped with two 25 H. P. motors, manufactured by the Steel Motor Company, of Cleveland, O. Stirling fare registers and sandboxes and Thompson fenders will be employed.

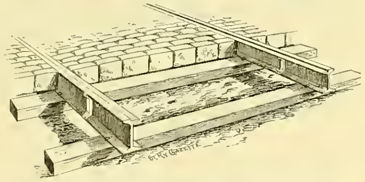
Fig. 2.—Track Construction of Nassau Traction Company, Showing Electric Welding.

The power house is located on a jetty in New York Bay at the foot of Thirty-ninth street. The building, the dimensions of which are 150×106 feet, is of the standard construction of the Berlin Iron Bridge Company, of East Berlin, Conn. Ample light and ventilation are provided by numerous large windows on all sides of the structure; in addition windows are built in the monitor roof extending the entire length of the building.

The foundations for the building rest on piles which were cut off at the low water mark. On the piling is a layer of concrete and on this the foundation for the machinery and buildings was built up. The foundations for the building and machinery are separate so that the building will not be affected by vibration from the machinery.

The power equipment will consist of five cross-compound condensing engines of 750 H. P. each, built by the C. & G. Cooper Company, of Mt. Vernon, O.; the engines will be directly connected to Westinghouse multipolar generators. The cylinders of the engines are 22 and 40 inches in diameter with 48 inch stroke. The engine speed will be 90 revolutions per minute. The fly wheels, which are 18 feet in diameter, weigh 40,000 pounds each. (See Fig. 3.)

The engines were especially designed for this class of work, and are provided with extra heavy solid cast bed plates and adjustable main bearings, by means of which the wear on the bearings can be taken up so that the space between the armature and field may be maintained the same.

The shafts are 18 feet long and are 15 inches in diameter in the bearings and 18 inches in the centre, with 30-inch journals. The entire weight of shaft, including the armature, is 63,000 pounds. The main steam lines are provided with butterfly valve which can be operated by hand or by the governor.

All wiring and steam pipes will be located under the engine room floor, which will be of cast-iron plates throughout. The steam piping will be in duplicate throughout, an arrangement which will reduce to a minimum the possibility of a shutdown. The contract for the piping system was awarded to Best, Fox & Co., of Pittsburgh, Pa.

The switchboard is conveniently located in the centre of the room and is of the standard Westinghouse type, with white marble panels and Westinghouse and Weston instruments. The location is such that a space of about three feet between the switchboard and the wall of the building is available for the examination of connections.

The engine room is equipped with a 34-ton traveling crane, with a span of 53 feet and 6 inches, built by the Berlin Iron Bridge Company.

The boiler plant consists of 10 Babcock and Wilcox boilers of 250 H. P. each, arranged in batteries of two each. Worthington surface condensers and feed pumps and circulating pumps are employed.

A complete coal handling system, built by the Trenton Iron Company, will be installed. Condensing water will be taken from the bay, and the company is putting down a well from which it is expected a sufficient supply of water for the boilers may be obtained.

The facilities for receiving fuel are most convenient. The location of the building is such that coal may be brought in barges to the boiler room. From the barges the coal will be conveyed to a hopper of 2,000 tons capacity located over the boilers, and thence coal shutes will lead directly to each furnace.

The brick-lined iron stack, 108 feet high and 10 feet in diameter in the clear, was built by the Coatesville Iron Company, of Coatesville, Pa.

The car house is located at Thirty-seventh street and Church avenue, and is of the Berlin Iron Bridge Company's standard steel, constructed with brick walls. There will be eight tracks with a total storage capacity of 80 cars. Waiting and toilet rooms will be provided for the comfort of the employees.

The repair shop is located on the same plot of ground and will be provided with the necessary tools for making all repairs. The company in the near future will begin the construction of a fire-proof machine shop, which will be equipped with the latest types of machine tools. The work was designed by A. H. Walker, the chief engineer.

CLEVELAND NATIONAL ELECTRIC LIGHT CONVENTION.

It is announced that these papers, in addition to the list already published, will be read at the Cleveland Convention of the National Electric Light Association, Feb. 19, 20, and 21: "A New Method of Measuring Illumination," by Professors E. J. Houston and A. E. Kennelly; "Underwriters' Rules vs. National Electric Light Association Rules"; "Practical Demonstration of Protecting Lines from Lightning," by A. J. Wurts.

Arrangements have been completed with the New York Central & Hudson River Railroad Company for a special convention train of Wagner vestibule, parlor, dining-room and buffet cars, leaving Grand Central Depot, Forty-second street, New York, at 9:30 A. M., Monday, Feb. 18, running as second section of the fast mail on the following schedule: Leaving New York, 9:30 A. M.; Albany, 1 P. M.; Utica, 3:17 P. M.; Syracuse, 4:40 P. M; Rochester, 6:30 P. M.; Buffalo, 7:25 P. M. (Central time); Erie, 9:33 P. M., arriving at Cleveland, 11:53 P. M. Seats can now be secured on this train by applying in person or by letter to the office of the National Electric Light Association, 136 Liberty street, New York.

The following gentlemen have charge of transportation in their respective districts, to whom application can be made for all information: A. C. Shaw, 620 Atlantic avenue, Boston, Mass.; H. A. Cleverly, 1018 Chestnut street, Philadelphia, Pa.; E. H. Heinrichs, Westinghouse Electric Company, Pittsburgh, Pa.; E. L. Powers, Monadnock Building, Chicago, Ill.

A special rate has been granted of one and one-third fare from all points in the United States east of the Mississippi River, Peoria and Chicago, to those attending the Cleveland convention. To obtain this rate it is necessary, in purchasing going ticket, to secure from the ticket agent a certificate, which, when properly indorsed at Cleveland, will entitle the purchaser to a one-third fair returning.

Albany, N. Y.—Mr. Blake, of New York, introduced a bill in the Assembly providing that in all cities with a population of over 200,000 the street-car companies shall be compelled to heat their passenger-cars during the months of November, December, January, February and March.

FORFEITURE OF CHARTER.

BY R. D. FISHER

Many and varied have been the comments on the decision of Justice Gaynor concerning the inability to operate street railways on account of mob violence occasioned and participated in by organized strikers and their sympathizers. It is apparent, from the temper of the people, and the tendency of the times, that it would be impossible to operate any railroad in this country if it were the law to be rigidly enforced that a road must forfeit its charter, if, even for a given number of hours, it failed to run its cars. Such a law would place such companies at the mercy of strikers, and such a ruling would be fallacious, unwarranted, and of such a strange legal blindness as to occasion friends of law and order extreme anxiety. Seldom has the popular dislike been more flagrantly reflected from the bench in an attempt to deprive a corporation of its legal rights. If courts hold that a street railway corporation, operating under a public franchise cannot freely contract for its labor like any other employer, but instead must pay what its employes demand, no matter at what sacrifice lest its service to the public should be impaired, few persons would care to invest money in a plant secured by a public franchise.

Street railway companies derive their privileges from the people, and are bound to accommodate the people first, and then look after the interest of the stockholders. But to hold that cars must be run in spite of labor troubles and organized opposition signalizes a tendency to surrender to a mob, a tendency that has already cost this country many lives and millions in money. To hold that if a company cannot secure employes at prescribed wages, it is bound to secure them at any price in order to operate its cars, is a most unfortunate utterance from the bench. The penalties sought to be prescribed in case of refusal or inability to operate a street railway on account of labor troubles growing out of differences concerning a scale of wages, is that of forfeiture of charter rights.

Forfeiture, legally defined, means the loss of something as a penalty for doing or omitting to do a certain required act (*Gosslink* v. *Campbell*, 4 Iowa, 300). It is the taking of property, right, privilege, franchise or benefit from a corporation (*Walter* v. *Smith*, 21 Ala., 672), a punishment annexed or prescribed by law to some illegal act or negligence in the owner of franchises or hereditaments, whereby it loses all its interest therein, and the same becomes vested in the (injured) public from whence it was derived, as a recompense for the wrong which the public has sustained (See 2 Bl. Com. 267, 1 Bouv. Dict., 602). The term forfeiture includes the loss as a penalty, and the transfer of the thing to another, or back without the corporation's consent, for the violation of some law or duty or obligation (5 Kent. Com., 67; 1 Story (C. C.), 134; Hadley Com., 703).

Forfeit means to lose as a penalty—includes a loss and transfer to another. Forfeiture is different from confiscation; the former relates to the acts of the owner, and the latter to the acts of the government. Confiscation is the appropriation of an enemy's property, and forfeiture is the appropriation of a citizen's or corporation's property on account of the violation of law (3 Am. L. J., 46). Fortunately, common law forfeiture does not exist in the United States. (See Constitution U. S., Art. 3, Sec. 3) By this provision no attainder of treason shall work for forfeiture; neither shall conviction or judgment work corruption or forfeiture of estate. (1 Mason, U. S., 174.) Acts sufficient to cause a forfeiture do not *per se* produce a forfeiture. The corporation continues to exist until the sovereignty which created it shall, by proper proceedings in a proper court, procure an adjudication of forfeiture, and enforce it. (People v. Manhattan Co., 9 Wend., N. Y., 351.)

The remedy was originally by quo warranto, but the modern remedy is by information in the nature of quo warranto, or some statutory substitute. (State v. Railroad Company, 34 Wis., 197.)

ENFORCEMENT OF FORFEITURE.

In courts of law equity will not enforce a forfeiture or penalty except when exclusively essential to do justice. (Story Eq. Pl. Secs. 521, 525.) The enforcement of a forfeiture cannot be had against a street railway company when the law excuses the performance of the condition or covenant in the charter complained of. (*Bradstreet* v. *Clark*, 21 Pick (Mass.), 389.) A condition subsequent is excused when performance is impossible by act of God or act of party or parties for whose benefit it was created.

A street railway corporation may be dissolved by reason of forfeiture of franchise, but such forfeiture cannot take place, except in clear cases of violation of the statute or charter provisions (2 L. R. A. 255; 104 Ind., 97.) In the creation of every corporation there is a tacit condition that the franchise may be forfeited for wilful misuser or nonuser, in regard to matters which go to the very essence of the contract between it and the people (R. R. Co. v. State, 29 Ala., 573).

There are four cases in which the question of forfeiture may arise in matters concerning street railway companies, viz:

1. Where the charter provides that on the failure of the corporation to observe certain expressed provisions or conditions, the franchises granted shall be forfeited, etc. (Thompson v. People, 23 Wend (N. Y.), 587.)

2. When the charter simply imposes certain expressed obligations upon the corporation, without saying in so many words that any violation thereof shall be the cause of forfeiture.

3. Where there are implied conditions resting upon the corporation by virtue of the acceptance of the charter; and

4. Where the corporation has violated some general statute, or rule of the common law.

Courts usually proceed with great precaution in declaring forfeitures and dissolving corporations, and it is not mere excess of power, nor simple omission of duty, that is regarded by them as a sufficient cause for the forfeiture of the charter of a corporation (51 Miss., 602). As a general rule, a forfeiture will not be declared except upon the provisions of the charter, or for a plain violation of the charter or some misuser or nonuser of its powers, by reason of which the corporation fails to fulfill the design of its creation. (Street Ry. Co. v. People, 73 Ill., 341; 41 Am. Dec., 109.)

Where a corporation is judicially found to be guilty of such acts or omissions as are expressly declared by its charter to be a cause for forfeiture of its franchise, the courts have no discretion, but must declare a forfeiture. (People v. Ry. Co, 63 Barb. (N. Y.), 98; State v. Ry. Co., 36 Minn., 246; State v. Company, 23 Ohio St., 121.) In other cases courts may, in the exercise of sound judicial discretion, refuse a judgment of forfeiture where, in the opinion of the court, the interests of the public do not require such a judgment. (State v. Company, 102 Ind., 283.) Where a cause of forfeiture exists, the fall of the hardship upon the corporation is no reason for not enforcing it. (103 Ill., 491.) In those cases where there has been substantial compliance with the conditions of the charter, or the requirements of the statute, a forfeiture will not be decreed, because the law exacts only a substantial compliance with its conditions and requirements, and is not rigid in enforcing forfeitures. A slight deviation from the provisions of the charter will not necessarily be regarded either as an abuse or misuser of it, and for that reason may not be ground for forfeiting the charter. (Chicago Street Ry. Co. v. Story, 73 Ill., 531; 14 Miss. (S. & M.), 599; 22 Eng. L. & Ey., 328.)

Only such acts of negligence or omission, as concern matters which are of the essence of the contract between the people and the corporation, and in which the public have an interest, are sufficient to induce courts to declare a forfeiture. (23 Wend (N. Y.), 538) Thus the courts will not decree a forfeiture merely for the violation of a legal duty, by the corporation, when such violation may be redressed by ordinary process of law. There must be a willful abuse or improper neglect, something more than mere accidental negligence, or mistake in exercising its chartered powers. It is true that if a corporation deliberately abandons a salutary duty prescribed for the benefit of the people, this will be sufficient cause for decreeing a forfeiture; and, indeed, there are a number of well considered cases which hold that a single act of willful nonfeasance may be insisted upon by the State as ground of forfeiture. (23 Wend (N. Y.), 222; 254; 28 Kans., 127; 65 Mass., 171; 11 Neb., 554.)

The suspension of the principal business of a corporation will be a sufficient ground for an absolute forfeiture of the corporate rights and franchises, where the corporation is such a one as owes to the public a duty. (*Ward* v. *Co.*) 7 Page ch. (N. Y. 294.) But the suspension of ordinary business means a substantial relinquishment of the principal or ordinary business; as, for instance, the refusal of a street railway company to run its cars. It was claimed that, under Justice Gaynor's recent ruling, there are only two sufficient excuses for not running cars on regular time, viz.: mob violence and inability to engage men to operate the cars. Against the first the judge claimed the corporations had ample protection, and against the latter there was evidences of sufficient labor at fair wages. This claim was disputed, and in a separate and distinct proceeding the true theory of the law was stated by Cullen J. holding that in the operation of a street railway, the company is absolutely entitled to protection; that the community owes a duty of protection to the company, in operation of its road, and as long as acts of violence and unlawful interference continued, such company has a sufficient reason for suspending operation, but that such suspension should not continue or be extended beyond a time which such company could operate its plant with the aid of the protection guaranteed by the authorities.

As a charter of a street railway company implies and requires that the corporation is to perform the business of running cars for the transportation of passengers, a duty for which it was created, a substantial suspension of that duty is a violation of law, for which a forfeiture may be had. But it is not a sufficient cause for a forfeiture of charter where a company ceases to run cars over a line, where there is not sufficient patronage to pay running expenses; nor where the company is interfered with by strikers and physical violence, no matter as to what causes brought about the differences between employer and employed. (*Commonwealth* v. *Ry. Co.*, 78 Mass., 780.)

NEW YORK RAPID TRANSIT.

The New York Rapid Transit Commission have adopted the following resolutions:

> Resolved, That counsel be instructed to submit at the next meeting of the commission a resolution in form for final adoption, confirming the routes already adopted on July 17, 1894.
>
> Resolved, That this resolution shall call for immediate construction on the west side as far as 185th street, and for extension to the city limits within a period hereafter to be determined upon.
>
> Resolved, That this resolution shall call for immediate construction on the east side as far as Forty-second street, and for construction to Mott Haven and the city limits within periods hereafter to be determined upon.
>
> Resolved, That this resolution shall make provision for future construction of a line proposed by the Board of Experts, running from the northern boundary of Central Park, through private property near Sixth Avenue, to the Harlem River.

The suggestion of the Board of Experts for an extension of the elevated roads was dismissed as being in conflict with the spirit of the law providing for municipal construction. Elm street was abandoned owing to the prospect of delay through lawsuits.

BROOKLYN STREET RAILWAY STRIKE.

The Brooklyn street railway strike is now a thing of the past so far as the companies are concerned. The last week has seen few new developments. The assaults on the new employees have been continued and wire-cutting has occasioned several delays, but violence is gradually subsiding. The strikers have prosecuted their legal attacks on the companies, but no victories have yet been gained.

PROTECTION FOR EMPLOYEES DEMANDED.

President Norton, of the Atlantic Avenue Railroad Company, again aroused the police department by a stinging letter published on Saturday last, in which he called the attention of the commissioner to the helpnessness and inefficiency of his force. He said that all the company's available cars were in operation and were manned by competent men, but since the departure of the troops all protection evidently had been withdrawn, and "we are left at the mercy of strikers and violators who continue their depredations, and are duly assaulting our employees." He mentioned an incident in which the conductor and motorman had been assaulted, and their injuries were so serious that they were taken to a hospital. No protection was offered by a policeman when appealed to, and no arrests were made. Mr. Norton added:

"So far as the Atlantic Avenue Railroad is concerned we have made up our minds it is high time proper protection was afforded us, and if we cannot get it from the departments who are expected to furnish it we shall furnish it at our own expense and expect the city of Brooklyn to reimburse us. I do not intend to waste one minute over this matter, but will proceed promptly and will give such instructions to our men that if they cannot be protected then they must protect themselves and our property."

President Norton, in a subsequent letter, asked that 374 men in the employ of the company be given permits to arm themselves by revolvers. The request was denied.

MAIL SIGNS OF TROLLEY CARS DECLARED LAWFUL.

In the last issue mention was made of the fact that proceedings had been instituted against President Norton of the Atlantic Avenue Street Railroad Company, because, it was alleged, he had violated the United States statute by displaying United States mail signs on cars not engaged regularly in carrying the mails. One of the former employees made the specific charge at the hearing before the United States Commissioner. He alleged that on Jan. 12 he had made eight trips on cars that carried mail signs but no mail. The company's counsel moved for a dismissal of the complaint, saying that the prosecution did not have the semblance of a case, that the road was acting under a contract with the Government which authorized the display of the signs on every car by reason of the fact that the company had to hold its cars in readiness at any and all times to carry the mails.

President Norton testified that there were two regularly-equipped white-painted mail cars which ran regularly, but that the contract with the Government was made in June, and was carried out long before the construction of the mail cars, which was not until August. He testified also that officers of the Post Office Department from Washington had examined the system, saw the signs and had approved of them. He also said that the practice obtained throughout the country, and he did not believe that the Second Assistant Postmaster-General would commit such a blunder, and he did not see how the contract could be carried out any other way than by having the cars in readiness.

The counsel for the prosecution cited the statute, and said that if the Post Office Department had authorized the placing of the signs on the trolley cars when they were not actually carrying mail, it authorized a direct violation of law. He claimed that the Department did not authorize such a violation, and that the statute could not be violated by any document issuing from the hands of an officeholder.

The hearing was adjourned until the original contract of the company with the Government could be examined by the Commissioner.

On Tuesday last the Commissioner dismissed the proceedings, as he found in his decision that there was no shadow of an excuse for the charge against Mr. Norton. The following appeared in the decision: "This evidence shows that it was not the intention of the accused to place signs on any other cars but those running on the mail route. It is clear to my mind that all the cars on this mail route were actually considered by the post office authorities and the accused as in use for carrying mail. The words of the statute are not 'actually carrying mail matter,' but the words are 'actually used in carrying.' And the same being so actually placed at the use of the post office department in carrying mail under an agreement with the Postmaster General of the United States on a post office route established by him under the laws of Congress, the placing of the words 'U. S. Mail' on only those vehicles running on that route, and allowing the same to remain thereon at all times when the vehicles were so run, for the purpose of carrying all or any mail that might be so received at any station, was not, in my opinion, a violation of Section 3,979 of the Revised Statutes of the United States."

ALLEGED VIOLATIONS OF TEN-HOUR LAW.

The examination of President Norton and Superintendent Quinn, of the Atlantic Avenue, on the charge of violating the ten-hour law took place before Justice Walsh. The law which two former employees charged Mr. Norton and Mr. Quinn had violated prohibits the officials of surface and elevated railroads within the limits of cities of a population of more than 100,000 working their employees for more than 10 hours in any 12 consecutive hours.

James Dwyer, one of the prosecuting witnesses, testified that on Jan. 12 he had worked on the road from 1:06 P. M. to 12:33 A. M. of the following day. He was required to work during these hours by reason of a schedule in force at the time. The witness then was asked about allowances for standing time, but asserted he did not know what were the rules. The examination did not proceed much further. The prosecution and the defence engaged in a controversy as to the necessity of producing the company's charter in court. Before arguments were concluded examination was waived and the matter was referred to the grand jury.

SYMPATHY OF BROOKLYN ALDERMEN FOR STRIKERS.

The Brooklyn aldermen have sympathized strongly with the strikers, and expressed themselves as ready to grant any demands made upon them by the former employees of the street railway companies. They were, therefore, led into passing resolutions of so ridiculous a nature that they were promptly vetoed by Mayor Schieren. The first resolution provided that "no motorman shall operate any trolley car while carrying passengers in any of the streets of this city unless he be twenty-one years of age, a resident of this State for one year and of the city for four months, and has obtained a license from the mayor for such purpose." Mayor Schieren disapproved of this ordinance because of its illegality, as it was "a restraint of trade or occupation, and also as being contrary to the Constitution of the United States, which provides that the citizens of each State shall be entitled to all the privileges and immunities of citizens in the several States."

In reference to the matter of license, Mayor Schieren in his veto said. "I doubt whether it is within the power of the common council to pass such a requirement. The law is well established that 'a municipal corporation has no power to require a license in order to carry on a certain pursuit, unless it be expressly granted, or arise by clear implication from language used.'" For similar reasons the mayor vetoed a separate resolution requiring the licensing of motormen.

On the afternoon on which the next meeting of the Board of Aldermen was to be held the leaders decided to organize a great demonstration in the interests of the strikers. The laboring men of the city were invited to gather on the plaza in front of City Hall in Brooklyn and demand that the aldermen pass a resolution revoking all privileges granted to the Atlantic Avenue and Brooklyn Heights railroad companies. The demonstration was a fizzle as a result of the sudden activity of the police force. It was feared by the authorities that a great gathering of people might cause trouble, and the policemen therefore kept the crowds moving, and no concerted action of any kind was possible. The aldermen, however, were so entirely inclined to do the bidding of the strikers that the demonstration was wholly unnecessary. At their meeting, after considerable foolish talk, the aldermen adopted a preamble setting forth that the companies were not furnishing safe transportation, and were hiring inexperienced men, and also the following resolution:

Resolved,—That the said permission and consent heretofore granted to the Brooklyn City Railroad Company and the Atlantic Avenue Railroad Company of Brooklyn, their successors and assigns, for leave to maintain and operate a surface railroad over, through, and upon various streets and avenues in the city of Brooklyn, and the resolution adopted on Jan. 11, 1892, granting permission and consent to said The Brooklyn City Railroad Company and Atlantic Avenue Railroad Company of Brooklyn, their successors and assigns, for leave to change their motive power from horses to electricity be and the same and each and all of them are hereby repealed, revoked and withdrawn.

It appears that absolutely no significance attaches to this action by the aldermen, and the resolution has been vetoed by the mayor.

PROCEEDINGS TO ANNUL A CHARTER.

Attorney-General Hancock gave a hearing last Monday at Albany on the application made by John Giblin, one of the executive committee of the strikers, for permission to bring a suit to annul the charter of the Brooklyn Heights Street Railway Company. Thomas Moore, the company's counsel, was the first to address the Attorney-General. He outlined the grounds of the application by saying that the reason the State officer had been requested to take action was because it was claimed that the company had ceased to exercise its functions by its own wilful neglect; that it had discharged its men, and since then had employed men in defiance of law. Mr. Moore then presented an affidavit of Daniel E. Lewis, the president of the road. The paper set out that the men had voluntarily ceased work, and then had committed depredations without number. The company had been compelled to call upon the police for protection, and they being powerless, by reason of the unlawful acts of the strikers, it became necessary to call out the militia of the State. Mr. Moore also read an affidavit of Alfred Nolan, the accountant, which gave the number of cars which had been run since the strike began, and said that the number of cars had gradually been increased until now sufficient cars were being run to accommodate the public. The affidavit of James C. Whittle, who has charge of the motor department of the railroad, was also read in rebuttal of the affidavit of John Giblin, the applicant, who claimed that the men were discharged. This affidavit set out that the deponent had charge of the dismissal of all men, and that the strikers had left of their own accord.

The number of cars injured was sworn to by John W. Gordon, superintendent of the repair shop. Affidavits were read from those in the employ of the company, who have charge of repairing trolley wires, stating the number of wires cut, and the streets which had been cut from car service thereby. These affidavits were followed by others from motormen who had been assaulted by strikers. Most of the deponents testified against the policemen, saying that the officers "stood like statutes" while the assaults were being made.

Mr. Sulzer spoke for the applicant. He presented a petition from 500 Brooklynites asking the Attorney-General to grant the application. If it was granted Mr. Sulzer promised that there would be no strikes in New York State in the future, for the matter would be pushed in the courts, and the real responsibility placed at the door of the railroad company. Mr. Sulzer said that there was little doubt that the company had violated its charter, and some action must be taken to let it be known that corporations could no longer grind the poor people of the country, and thus pay 10% on watered stock of $30,000,000.

Other counsel presented arguments for and against granting the application, but no points of interest were developed. The hearing closed with the understanding that both sides should file briefs.

MANDAMUS PROCEEDINGS.

Judge Gaynor, on Monday last, granted the application of a Brooklyn merchant for a mandamus compelling the Atlantic Avenue Street Railroad Company to operate all its cars. The writ was alternative and not peremptory, as the company raised questions of fact in its answer. In his opinion detailing the reasons which led him to grant the writ. Judge Gaynor said: "I cannot acquiesce, or even seem to acquiesce, in statements which have made it appear that mob violence or riot has ruled in Brooklyn, and which have not only given a law-abiding community a bad name, but by exciting fear in many must have done incalculable damage to business interests. To try to forcibly prevent the company from doing its public duties would be lawlessness, while, on the other hand, for the company to stop running cars in order to beat down the price or lawful conditions of labor would be lawlessness of a much more dangerous and far-reaching character."

It is difficult to see that any force can attach to this opinion. Although the Court seemed disinclined to believe in the allegations that acts of violence were continually committed, it is the fact that some scores of non-union workingmen were the victims of assault while the application was being considered by Judge Gaynor. Again, it would seem scarcely reasonable to ask the Atlantic Avenue Company to do any more than it was doing. According to the statement of President Norton all cars that had not been rendered unfit for use on account of the attacks of strikers were already in service.

TROLLEY MAIL SERVICE FOR PHILADELPHIA.

In his annual report Postmaster Carr, of Philadelphia, makes the following reference to trolley mail service:

> This city presents many difficult problems with reference to postal improvements, and one of them is found in an attempt to use the trolley systems. In some of the other cities the electric roads have been used for the transmission of the mail between stations, but in this city few of the street railways have double tracks, which seriously interfere with the economical or convenient transmission of mails by the trolleys. Another serious obstacle is the fact that the locations of the sub-stations are not such as will permit the use of the trolleys. A careful investigation of the question has been made of the whole city with regard to the location of the sub-stations, the direction of the trolley lines contiguous thereto and the method of circulation of the mail by transfers. It was found that the only road which at present could be used when completed is that connecting the Eighth Street Station, at Eighth and Columbia avenue, Nicetown, Germantown and Chestnut Hill, and it is contemplated that an arrangement may be made for the transmission of the mail between these stations by the cars of this road.

GRADE CROSSINGS.—Most electric companies secure the right to use highways or streets at small cost. Hence there is little hardship in requiring them not to cross steam railroads at grade. Some accidents have already occurred from trolley cars getting in front of locomotives. Before the list is lengthened steps should be taken generally to render collisions on account of grade crossings impossible.—*New York Tribune.*

THE BROOKLYN STRIKE FROM A FINANCIAL POINT OF VIEW.*

The most serious of the blows which have been struck at the Brooklyn Heights Railroad Company was the application made last Monday asking the Attorney-General to bring suit to annul its charter. This is aimed at the company's corporate existence. If it succeeds it will wipe out a corporation which, while small in itself, represents and controls the investment of millions Important as the blow is meant to be, however, it seems singularly futile.

The complaint was made by John Giblin, a member of the Executive Committee of District Assembly No. 75. This man is said to be far cleverer than the average, to have received an excellent education, but to possess visionary and destructive ideas regarding the rights of capital and the wrongs of labor. In his affidavit he said that he had been employed by the company for five years, and gave an expert opinion to the effect that the change from horses to electricity required great skill on the part of the employes. For the proper operation of the road, he said the company had come to an agreement each year with its 4,000 or 5,000 employees." This year, however, it not only refused to make one, but also refused to pay just and proper wages. Its sole object in doing this was to increase its earnings, while disregarding the rights not only of its employes but of the public. On Jan. 13 the company discharged a large number of electric workers. These men had charge of machinery used in running the cars. Their discharge made the operation of the roads extremely dangerous, and for this reason the other employees of the company refused to work. He alleged also that the company tyrannically exacted longer hours of labor than those legally provided. From Jan. 14 the company practically ceased to operate its cars, and, the complaint added, "There is no reason to believe that the defendant intends to act in the future otherwise than for the past several weeks." In violation of chapter 366 of the laws of 1890 the company secured employees from other cities. Most of these were incompetent and some were minors. For all these reasons their complainant requested the Attorney-General to bring action for the annulment of the franchise of the Brooklyn Heights Company.

As has been said above, this proceeding seems strangely futile. In the first place, it is doubtful whether anything can be accomplished by it. In the second place, even if it succeeds, it will practically accomplish nothing. The complaint contains two main points upon which it attempts to obtain the action of the Attorney-General. The first of these is that it did not and will not operate its cars. That reason was contrary to the facts of the case when the complaint was made, and is doubly inaccurate now that nearly 600 cars are in operation over the entire 200 miles of tracks operated by this company. The second reason given is the employment of men from outside the State. The law enacts no such severe penalty for its violation, and provides merely a fine. In the opinion of the lawyers of the company, though, of course, their ideas are certain to be rather one-sided, the case as it has been presented will make it impossible for the Attorney-General to do as requested.

Even if this proves untrue no one need be unduly agitated. The application is made against the Brooklyn Heights Railroad Company, and can be made only against that company, for it alone is responsible for the failure to operate cars and for the employment of men from outside the State. The suit cannot be brought against the Brooklyn City Railroad Company, for that corporation has leased all its lines to the Brooklyn Heights. If the charter of the Brooklyn Heights company should, by some legal miracle, be made void, it would not affect the franchises nor the corporate existence of the Brooklyn City Company in the least. The latter corporation could and would immediately operate its own lines with its own plant, for it must be remembered that power houses and equipment all belong to the Brooklyn City Railroad Company and not to the Brooklyn Heights. The only line which would be at all affected is the little cable road on Montague street, as this is the only one which the Brooklyn Heights Company owns. The success of the proposed action, also, could not possibly invalidate the property interest of the Brooklyn Heights Company in the lease of the Brooklyn City Railroad, in the Guarantee Fund of $4,000,000 which secures the payment of rentals to that company, or in the stock of the Brooklyn, Queens County and Suburban Railroad Company which it holds. The annulment of its charter and franchises would be, of course, followed by a transfer of its property interests in these investments to another company officered by the same men, and, like it, controlled by the Long Island Traction Company. Instead of destroying the terrible trolley juggernaut its name would be changed, and that is all that could be possibly accomplished.

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* *Brooklyn Eagle.*

Another example of strike litigation was begun on Wednesday last, when Mr. M. Labor Towns applied to Justice Gaynor for an order directing the Atlantic Avenue Railroad to show cause why a peremptory writ of mandamus should not be issued to compel it to operate its line. This application was practically the same as that made in the case of the Brooklyn Heights Company. The only difference was in the statement that, through Mr. Connelly, the men had offered to return to work at the old wages and had been refused. The answer submitted by the company was that it had men enough to operate its cars, that any failure to operate was caused by violence, and that the only reason why it was not—at the time the answer was made—operating its full equipment was the fact that many of the cars had been so badly injured by evilly disposed persons as to require extensive repairs. Justice Gaynor reserved his decision.

On Tuesday Justice Gaynor signed the alternative writ in the Loader case against the Brooklyn Heights Company. By the time the writ is returnable the company will be running its cars as usual.

The legislature has continued to show considerable interest in the strike. Several bills have been introduced calling for investigation or proposing remedies. The most mysterious of these were the two resolutions proposed by Senator Bradley on Wednesday. The senator's first resolution sought to direct the railroad commissioners to report what railroad companies have increased their capital stock since the board was created, together with the amount of capital at that time, each several increase and the names of the commissioners who voted to grant permission. His second resolution was to compel each railroad company to transmit to the Senate a statement showing each increase of capital stock, how such increased stock was used, sold or disposed of, and how the proceeds were paid out, together with the names of all parties who have been paid sums of $25 and over and for what purpose. Mr, Bradley later amended these resolutions so that they will apply, if passed, only to elevated and street railroads in cities.

The gossip of Albany, as well as of Montague street, intimates that these resolutions are directed against the Long Island Traction Company. There has been an enormous amount of talk about the way in which the Brooklyn City Railroad Company's stock has been watered and concerning an alleged corruption fund used to secure the trolley franchises. It is difficult to see, however, how such resolutions or how any resolution will affect the Long Island Traction Company in any way. In the first place the Long Island Traction Company is not a railroad company. It is practically a trust company formed for the purpose of purchasing and owning securities. It has no railroad lines, nor does it operate any. It simply owns the stock of the Brooklyn Heights Railroad Company. The fact that the Brooklyn Heights Company leases and operates another railroad system does not make the Traction Company a railroad company any more than the investment of the funds of any other financial institution in the securities of any other railroad company would make it responsible for the acts of the latter. Certainly not in letter, no matter what they do in spirit, do Senator Bradley's resolutions apply to the Long Island Traction Company. On the other hand, it is doubtful whether the Legislature of the State of New York has any power over the Long Island Traction Company, excepting to regulate the collection of taxes upon property owned in this State. It is not a New York corporation, but a Virginia one. It has an office in this State, but that is simply for its own convenience in looking after its investments situated here. How can the Legislature of the State of New York investigate a Virginia financial corporation which have investments here, with more propriety than the Virginia Legislature can investigate any New York trust company which has invested its funds in the securities of some Virginia railroad?

Apropos of all this, it may be fairly stated that the columns of talk and of scribbling which have been published concerning the watered stock of these Brooklyn railroads amount to nothing but rubbish. No one who had the slightest knowledge of financial matters would injure his reputation by giving utterance to any of it. What is water in the financial sense? It is a term used to denote any increase in capital or any issue of securities for which nothing has been paid or nothing has been received. For instance, if the A., B. and C. Railroad Company is capitalized for $1,000,000, and, without increasing its construction or equipment, it distributes another $1,000,000 of capital stock among its stockholders, while receiving in return nothing, that extra $1,000,000 is water. If this is a correct definition, and its accuracy cannot be denied, where is there any water in the stock of any surface railroad company in Brooklyn? It is true that the Brooklyn City Railroad Company increased its capital stock from $6,000,000 to $12,000,000 and its first mortgage bonds from $3,000,000 to $6,000,000. It is also true that for every dollar of stock and bonds so issued a dollar was received by the railroad company. And it is also true that every dollar so received was spent for construction. Under the laws of the State of New York, any money spent for increasing the equipment of a railroad company may be capitalized and the additional stock so issued may be distributed to the stockholders as a dividend—that is without payment.

The reason for the existence of such a law is plain. The expenditures for new construction or for extensions, made out of the surplus earnings, is a diversion of those earnings from the pockets of the stockholders. And the issue of stock under these conditions is merely returning to the stockholders what would otherwise have come to them in the way of dividends. If the law permits this and does not call it water, how much less water must be an increase in capital for which the stockholders paid par? It is impossible to say that the stock and bonds of the Brooklyn Heights company have been watered. These have been issued for only small amounts and represent a property interest in the lease and guarantee fund as mentioned above. The only part of this system where the word water may be used correctly is the capitalization of the Long Island Traction Company. This is $30,000,000, while the stockholders paid only $4,500,000 for the entire amount. The other $25,500,000 of course is water. But what has the Legislature of the State of New York to do with it when the corporation was formed under the laws of the State of Virginia, which permitted it? What injury can such water do any one when it was done openly and when there was no pretense that the nominal capital was worth the $30,000,000? What difference would it have made to any one whether the capital was put at $30,000,000 or at $4,500,000? There would have been no difference.

What has been said about the Long Island Traction system is true of the Brooklyn Traction system. The Atlantic Avenue Railroad Company increased its capital stock, its consolidated mortgage bonds and created a new issue of improvement bonds. But these were sold for cash and the money was used in the electric conversion of the roads. It is true that the Brooklyn Traction Company was capitalized for $9,000,000, but this also is a financial institution incorporated in another State and subject to the State of New York only for taxes on property held here.

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WATER POWER DEVELOPMENT AND ELECTRIC TRANSMISSION FOR ATLANTA, GA.

For several months past, negotiations have been in progress looking to the development of large water powers known to exist on the Chattahoochee River near the city of Atlantic, Ga. The matter has chiefly been carried forward by Mr. J. H. Vail, of New York City, and has now focalized in the organization of the Atlanta Electric Power Company, which concern will control an aggregate of about 30,000 H. P., divided between two powers; one-half of the amount within nine miles of the city of Atlanta, and the remaining amount of 15,000 H. P. within 13 miles from the same city. Both powers are derived from the rapids and shoals of the Chattahooche River.

The first construction of dam and power house will be located on the property of Mr. A. E. Thornton, near Vinings Station, of the Western & Atlantic Railway. The surveys have been completed and the plans and specifications for the construction of the dam and power house and system of transmission are finished. The principal parties interested are: James Swan, president of the Atlanta National Bank, Atlanta, Ga.; A. E. Thornton, vice-president Atlanta National Bank, Atlanta, Ga.: H. R. Garden, lawyer, of New York City; J. H. Vait, president of Electrical and Mechanical Engineering Company, of New York City, together with other prominent business men in the city of Atlanta, who are largely interested in the enterprise.

The entire construction has been placed in the hands of the Electrical and Mechanical Engineering Company, No. 39 Cortlandt street, New York city. Ground will be broken at an early date and the work pushed forward rapidly. The development of this power will have great influence on the future prosperity of the city of Atlanta, affording the highest modern development of electric transmission and the distribution of power for large manufacturing purposes, as well as for arc and incandescent lighting, heating, and all allied industries. This project will be of lasting benefit to the city of Atlanta and to the South generally, and bids fair to make Atlanta the great manufacturing centre in the Southern States.

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Chicago, Ill.—Ordinances have been passed giving to the North and West Chicago Street Railroad Companies the right to build several new lines and operate them by the overhead trolley system.

ECONOMIC STREET RAILWAY MAINTENANCE—THE REPAIR SHOP.*

BY KEPPELE HALL.

The growing popularity of the electric railway and its very rapid extension have given an opportunity for many engineers and managers to relate their experiences and opinions and express their views as to the most economical method of conducting a road. The majority of these discussions, or at least a goodly proportion of them, have had reference to the power station, and this is justified by the fact that it is most important. Not only does the whole traffic of the line depend upon it, but such a large amount of capital is represented by dynamos, engines, boilers and appliances that to neglect it or be careless as to its management would be suicidal to the interests of any road.

Now, a street railway is not a toy. On the other hand it is a very complicated device to handle. Its branches are numerous, and, as in all large undertakings, so in this, the ultimate success of the whole depends upon the perfect working of all the parts. Many roads are struggling along with indifferent success for the simple though unappreciated reason that some branch of the system is being poorly operated and acting as a drag on the whole enterprise.

The repair shop and its function in railway work is undeniably a great factor in success or failure, and it is to this department that I wish to confine this article. I have had the good fortune to have passed through the mill, not as an expert or a manager, but as a laborer working in the pit, carrying armatures, cleaning and repairing motors and controllers, and it is from this standpoint that I think I may be able to offer some practical suggestions as to the best arrangement and operation of the repair shop.

Mr. Hamill, general manager of the Brush Company, mentioned to me in a recent communication two roads that had, within a day or so of writing, failed. After going into some particulars concerning them, he sums up the matter very concisely. "My impression is that both of these roads under careful management would have no difficulty whatever in earning first-class dividends. I simply cite these two cases because they have just been brought to my attention, in order to show that the demand for good management is greater than the supply. The more actual practical experience you have in this ordinary laborers' and mechanics' work, the better foundation you will have for the future."

Where the repair shop is located in the car barn a little care in its arrangement will greatly facilitate work. It is well to have a number of tracks set apart for the crippled cars, and to use a little judgment in placing them so that the car you wish to work on can be got at, repaired and sent out on the road without drilling nearly every car in the barn. It is always advantageous to have a number of tracks running into the barn from the street, and at least two of these kept clear all the time. Much is saved by having the transfer table operated by a motor, and a great deal is lost by having a rusty, rattling, dilapidated affair that takes all hands from their work every time a car has to be moved from one track to another. There must be one place set apart for the removal of wheels where a part of the track and beam work can be removed and the wheels dropped into the pit. A very simple and easy way to get these wheels out of the pit after they have been taken from the car is to have a pulley overhead, a snatch block on the floor, and by attaching one end of the rope to the wheels and the other to a motor car, raise them out of the pit and lower them on the track, when it will be easy to get them whenever they are wanted. A good strong chain fall and a couple of jacks will be found in almost constant use about the barn.

Instead of having a pit dug out in the dirt the width of the track it will be found an economy to have under all the tracks an open cellar the floor of which is cemented and well drained. Brick pillars will support the track and floor beams. Keep this place fresh and clean by daily sweeping and a weekly scrubbing, having the brick and woodwork always freshly whitewashed. Have plenty of light, and it will be found that the three or four pounds of coal consumed per hour at the power station for every 10 lamps burning will be more than paid for by the amount of work and the superiority of its character that can be gotten from the men. This is a view of economy that is too often overlooked by our managers, who are apt to consider only the interest on investment, depreciation of stock, and output in wages in gauging the expense of maintenance. It is no unpractical theory, but solid truth and fact, that a man who has good tools to work with and a comfortable place to work in will be kept in a contented frame of mind, and do nearly twice as much work as one whose time is taken up grumbling because his wrench has spread and every now and then slips and takes the skin off his knuckles, or because he is so cramped for space that he can't draw his hammer back to strike a blow, or because he can't find his tools, and every move he makes he bumps his head and loses his temper. A man, even an ordinary laborer, has some mental sensations that affect his working efficiency to a startling extent. If any one has doubts on this subject let him put on a pair of overalls and get down into the pit and see how he feels after a hard day's work under such conditions, especially if it is winter and there is not sufficient steam heat to keep him warm nor thaw the snow and ice off the trucks and motors.

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* From the *Electrical World*.

It will be found greatly to facilitate the working to have cars or trucks in the pit into which the armatures that are to go to the machine shop can be lowered. They can then be wheeled to a trap in the machine shop floor near the lathe and be raised by a chain fall that is always suspended there for that purpose, then lowered directly into the lathe, or transferred by another car, arranged as a winding stand, to the armature winder's corner, as occasion may require. This will prevent a needless waste of time and strength carrying the armatures or rolling them along the floor to the shop, which does not improve them in any event.

The machine shop should be located near the pit in order to permit of this arrangement. As to the equipment of this shop, a large and small lathe, a large and small drill press, shaper, emery wheel, grindstone and a good assortment of tools, including a set of taps and dies and a blower for cleaning armatures, will be found sufficient. Let the armature winder have a corner and provide him with the necessary appliances, among them a good magneto. Not only will this shop be all that is necessary for repairs, but it will permit of the manufacture of numerous little articles that are always being wanted around the barn and on the line. A carpenter shop, a blacksmith shop, an oil house, and a stock room will complete this department. The carpenter shop should have a full line of the usual tools and a buzz saw. The saw and all the machinery in the machine shop can be run by one or more motors attached to the power circuit. The oil house should be isolated and contain all the oil and grease barrels. It should always be kept locked and the key hung in a convenient place inside the shop. The stock room should be supplied with brushes, brush holders, commutator segments, heads, rims and mica; contact segments and fingers, if these are used; bolts and nuts of usable sizes; cotter keys, screws, nails, cord, tape, wire, lamps, switches, sockets, shades and shade holders; glass panes, waste and articles in the line of tools and others that will be found necessary from experience. When anything is taken from this room a memorandum should be made on a slate with the number of the car on which it is used. This, entered in a book kept for the purpose, together with the hours of labor, taken from the workmen's time slips, will preserve a record of the cost of each car, and will always be valuable data to have at hand.

System is everything. Every man and every gang of men must have some definite work each day. Always have a complete set of tools for each such gang. Let this include wrenches to fit all the nuts on the motors and trucks, hammers, cold chisels, bars, etc., and insist that they be returned to their proper place when not being used, and under no circumstances allow them to be employed by other than the persons for whose use they are intended. With such an understanding there will not be the continual hunting around for some misplaced article and things will run smoothly.

It is almost impossible to say exactly how many men are necessary in the repair shop. The wear on the machinery is dependent to such a large extent upon the system in use, kind of track and roadbed, grades and curves, that the amount of repair will vary greatly, even for roads maintaining the same mileage of track and number of cars. A few general hints may be of some value however. In the first place, I consider it unwise to have the night gang do repair work when it can possibly be avoided. Let their work be confined to tightening up loose bolts and carefully oiling and greasing motors, trucks and trolleys. If necessary increase the gang of men on day turn. A road with which I was connected one summer, operating 35 cars on 11 miles of double track, kept all in good running order with a machinist and helper, carpenter, blacksmith and helper, armature winder, and three men on repairs of trucks and motors, on day turn; while at night there were four men to do the work mentioned above. The carpenter and machinist were often called out of the shop to do work on the line, and some times all of the men, when there was too much for the linemen to attend to, or a car jumped the track or broke down on the road. About three-fourths of the cars were equipped with Short motors two years old and the balance with new G. E. equipment. Almost nine-tenths of the work was on the old motors, and I feel certain that with a complete installation of new motors and controllers, possessing, as they do, such great advantages over the old in every respect, the force of men could be cut down considerably. Old wheels and axles were sent to the factory, but all other work was done in the shop. The axles were numbered, and a record kept in connection with other repairs, so that the life and mileage of the wheels could be told. In removing armatures, cleaning motors, inspecting bearings, etc., two men can work together in the pit to advantage, a third man being useful to operate the chain fall, but otherwise in the way. Small repairs could of course be attended to by one man. When new cars were to be equipped an extra machinist, carpenter, and a couple of laborers were employed until the cars were wired, the trucks assembled and motors mounted.

On very large roads operating hundreds of cars, or on very small ones operating only 5 or 10, these suggestions must be modified to suit circumstances. There may have to be a number of repair shops and car barns, and these may be separated from each other. The amount of work done may make it advisable to own and operate machinery that in smaller roads would not pay. Again, it may not be economy to have as extensive a repair shop as has been described here, or any at all. But on the average road I feel sure, from my own experience, that by following out the ideas enumerated herein, street railway managers will find something to be gained.

It is impossible to go into the minutiæ of repair shop practice, as it would cover pages and be tiresome reading. A bright engineer can always see a way to meet circumstances as they arise, and work new ideas into a well-planned system.

I have not mentioned track and line repairs, the management of the station, inspection of cars, nor the drill and discipline of motormen. All of these are very important, the last more so than is usually appreciated, but they were not intended for discussion under this subject, and any one of them is worthy of an article by itself.

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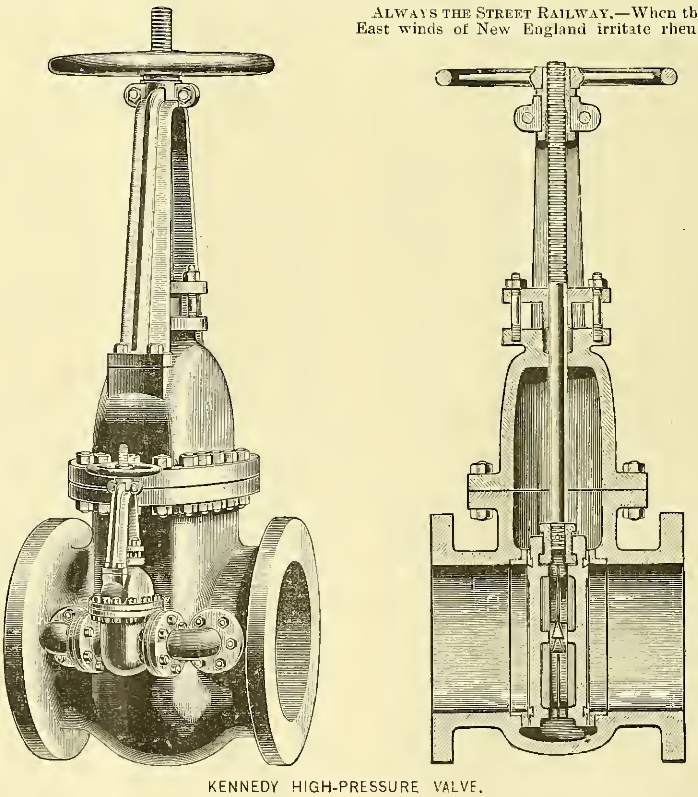
KENNEDY HIGH-PRESSURE VALVE.

The accompanying illustrations represent a new valve designed for extra high pressure and superheated steam. These valves are designed to withstand the hard service incident to plants carrying from 125 to 250 pounds steam pressure, and are made unusually strong so that they may resist the strains caused by expansion and contraction to which they are subjected.



KENNEDY HIGH-PRESSURE VALVE.

The construction of the valve, which consists of two parts, may be seen by the cut showing the section. Both discs are guided upon their sides to prevent contact with their seats until closed by guides in the body which engage with corresponding guides or wings on the valve or discs. The discs or valves are equally tight on either face, and either end of valve may be used for inlet or outlet. The gates are kept tight by two large right and left screws of abrupt pitch which force them direct to their seats. In this way the constant cutting or pinching of the seats is avoided. The seats are removable and interchangeable. The bodies are made from heavy patterns of best iron, bronze mounted, with either steel or bronze self-packing stem. The valves are made with inside screw or outside screw and yoke, and with or without bypass. The flanges are tongued and grooved when so desired. The valves are made by the Kennedy Valve Manufacturing Company, of New York.

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COMMENTS AND VIEWS OF CONTEMPORARIES.

Cheap Fares in Philadelphia.—The reduction of fare by the trolley cars to Germantown to five cents and to Wissahickon and Manayunk to eight cents furnishes two very practical illustrations of the benefit to the public of the introduction of the new street car motor. One reduction was inspired by competition and the other appears to have been a concession to a popular demand, possibly expedited by a desire to anticipate steam railroad competition.—*Philadelphia Times.*

Trolley for Suburban Steam Lines.—Some of the railroad lines terminating in Chicago issue commutation tickets at rates which are so low that they hardly need fear loss of custom, but if they, too, were to adopt the electric force as a traction power, and find it cheaper than the steam locomotive, they would have an additional advantage for such of the suburban business as is not drawn away from them by the offer of cross-transportation on the distributive trolley sublines. — *Chicago Tribune.*

Always the Street Railway.—When the raw East winds of New England irritate rheumatic tissues, or pangs of indigestion disturb our serenity, we have a way of taking revenge by abusing the street railway. The manifestation has its roots in kindliness. At times inward disquiet must find outlet in growls. Rather than to scold sentient beings, whether brute or human, how much better it is to turn the stream of talk against a corporation that according to the familiar definition has no body to be kicked and no soul to be damned.—*Hartford Times.*

LICENSE FOR MOTORMEN.—The safety of the public demands that motormen on electric cars shall be skilled workingmen and hold a regular certificate of capability to discharge their duties from some legally constituted board or commission. No man can mount a locomotive engine unless he has a commission declaring that he is able to run his machine. Electric engineers must, in like manner, have their certificates of competency. Motormen should be brought under the same general law, so that, in the interests of the people and of labor, it will not be possible for corporations like the trolley companies of Brooklyn, when they have disputes with their employees, to supply their places with greenhorns picked up on the street corners.—*New York Recorder.*

COMPETITION WITH STEAM ROADS.—Competition of trolley roads with steam railroads for local traffic has assumed a serious aspect. Reducing the number of trains reduces expenses, but tends to agravate the competition. To meet it more trains will have to be run at greater speed, and even then competition will continue, because of the lower rates of fare on the trolley lines. For a time there will necessarily be losses to the steam roads during a readjustment of the habits of the people. It is not improbable that in the end the steam roads will lose much of their local business, but by the time that result has been reached the trolleys will become important feeders to the steam roads, and they will undoubtedly encourage the habit of traveling, and increase the necessity for traveling accommodations by inducing the settlement of suburban sections of the city.—*Philadelphia Public Ledger.*

FINANCIAL NOTES.

The Worcester Traction Company's report for December shows a net income of $12,516, against a deficit of $3,303 in December, 1893.

Brooklyn Elevated Figures.—That the strike on surface roads in Brooklyn has been beneficial to the Brooklyn Elevated is shown by these figures for January: For the week ending Jan. 28, receipts, $60,964; increase, $28,250. Since Jan. 1 the receipts have been $189,749: increase, $59,926.

Sale of the Ranier Property at Seattle, Wash.—The Ranier Power and Railway Company's plant was sold at public auction recently at Seattle, Wash., to Angus McIntosh, M. Ambrose, and Frederick Bausman for $15,500 cash. When confirmed by the court the sale will not be subject to redemption.

Philadelphia, Pa.—The use of transfers between the lines of the People's and Electric Traction companies, under the arrangement which went into effect several weeks ago, is steadily increasing. About 30,000 a day are used now, and they are almost equally divided between the two companies.

Possible Stock Issue in Milwaukee.—President James Petley, of the Milwaukee and Wauwatosa Motor Railway company, says that if the council grants it a franchise to extend its line to the Northwestern depot, it will turn its entire system into an electric road, increase its capital from $200,000 to $500,000 and have the down-town line in operation by July 1.

Baltimore Traction Report.—The annual report of the Baltimore Traction Company gives the following figures for 1894: Gross earnings, $1,012.319; operating expenses, $623.039; balance above operating expenses, $389,279; decrease in gross earnings compared with 1893, $50,565, decrease in operating expenses, $66,278: increase in balance above operating expenses, $15,712.

The Dry Dock, East Broadway & Battery Street Railway Co., of New York, has filed its report for the quarter ending Dec. 31. Following is a summary: Gross earnings from operation, $182,528; operating expenses, $135,948; net earnings, $46.580; other income, $3,538; gross income, $50,118; fixed charges, $32,845; net income, $17,273; cash on hand, $35,752; profit and loss (surplus). $114.

The Forty-second Street, Manhattanville & St. Nicholas Avenue Street Railway Co., of New York.—The following figures appear in the report of the company for the quarter ending Dec. 31: Gross earnings from operation, $164,654; operating expenses, $132,246; net earnings, $32,407: other income, $999; gross income, $33,407; fixed charges, $30,712; surplus, $2,694; cash on hand, $1,693; profit and loss (deficiency), $51,374.

Tamaqua & Pottsville Bonds.—A mortgage has been placed on record from the Tamaqua & Pottsville Electric Railroad Company to the Columbia Avenue Saving Fund, Safe Deposit, Title and Trust Company of Philadelphia, dated Jan. 15, 1895, for $250,000, secured by the property and franchises of the company. As the title of the company implies, the route of the road will be from Pottsville to Tamaqua through the Schuylkill Valley.

Electric Work in New Orleans.—After the annual meeting of the Canal & Claiborne Street Railway Company, of New Orleans, Secretary De Grange announced that there had been some talk about the substitution of electricity on the lines, but said that there was nothing that would warrant the statement that the road would be equipped in the near future. He said that there had been no proposition from anybody to purchase a controlling interest in the road.

Portland Railroad Company.—At the annual meeting of the stockholders of the Portland (Me.), Railroad Company, a report was presented giving the following figures for 1894: Gross earnings, $206,489.75; total operating expenses, $165,435.52. The total number of passengers carried during the year was 371,913, an increase over the previous year of 122,778, this increase being principally on the Congress street and Deering lines. It was voted to equip all the city lines with electric railway.

Beaver Valley Traction Company.—The following figures are taken from the annual report of the Beaver Valley Traction Company, of Beaver Falls, Pa.: Gross earnings, 1894, $59,756; 1893, $62,878; total operating expenses, 1894, $33,685; 1893, $40,660; net earnings, 1894, $11,414; 1893, $7,233. During 1894 the number of passengers carried was 1,155,213; the car mileage, 400,648; the cost per car-mile, 8.4 cents; the per cent. of expense to earnings, 56 per cent.; the actual operating expenses, percentage of gross receipts, 1892, 78 per cent.; 1893, 62 per cent.; 1894, 53 per cent. The secretary and general manager of the company, Hartford P. Brown, in his annual report to the stockholders refers as follows to the wonderful freedom from accidents on the road: "The road transported, for revenue, during the year 1,155,213 passengers, and, so far as known, we have not had a single personal injury charged against us. The cars of the company during the year traveled a total of 400.648 miles, up and down the valley, at all hours of the day and night, through dense fogs, and in all kinds of weather, while we paid out for damages to property, the meagre sum of $82. There is, perhaps, no other instance on record, of a street railway company, operating the same length of road, with as heavy grades, as sharp curves, and as much single track, which can make as clean a showing on account of accidents, and the employees deserve great credit for their carefulness, which has enabled us to make this satisfactory report."

NEW INCORPORATIONS.

Fall River, Mass.—The Fall River & Providence Street Railway Company has been incorporated by Charles F. Shaw, of New Bedford; Frank S. Stevens, of Swansea; Robert T. Davis, George W. Slade, Frank W. Brightman, William F. Thomas, and Benjamin Cook, of Fall River. The capital stock is to be $250,000.

Hingham, Mass.—The Hingham Street Railway Company has been incorporated. The capital stock is $45,000. The company proposes to construct a street railway to run from Hingham to Hull. The promoters are Walter B. Foster, I. I. Moore, Bradford C. Wilder, Hingham, Mass.

Ballston Spa, Pa.—The Ballston Electric Railroad Company has been incorporated with a capital stock of $200,000. The company proposes to build and operate a street surface road, 10 miles long. The promoters are: Thos. Craig, Trenton, N. J.; C. E. W. Smith, New York City, N. Y.; F. R. Barnes, Ballston Spa, N. Y.

Frankfort, N. Y.—The Frankfort and Utica Street Railway Company has been incorporated with a capital stock of $70,000 to build and operate a street surface road in Herkimer County, seven miles long. The promoters are J. V. Quackenbush, Mohawk, N. Y.; Clinton Beckwith, Herkimer, N. Y.; N. J. Davis, Utica, N. Y.

Lorain, O.—The Lorain and Wellington Railway Company has been incorporated with a capital stock of $100,000. The company proposes to construct and operate a street railroad between Lorain and Wellington, O., furnishing electric light, power, heat, etc. The promoters are H. C. Redington, E. M. Pierce, Jno. Stang, Q. Gillmore, J. W. Steele, O. F. Carter, Jas. Nicholl, Jr.

Baltimore, Md.—The Frederick-McCabe Construction Company, of Baltimore, has been incorporated. The capital stock is $50,000. The company proposes to do general contracting and electrical engineering work, to manufacture and sell electric dynamos, motors, lights, accumulators, etc., to construct railways, telegraph and telephone lines, and lighting and heating power plants. The promoters are Jas. F. McCabe, Lawrence N. Frederick, Frank H. Sloan, Lawrence P. McCabe, Francis E. Yewell, Wm. C. Stocksdale.

NEWS OF THE WEEK.

Newark, N. J.—The trolley ordinance has been passed by the Franklin Township Committee, under which franchise will be granted to the Passaic and Newark Electric Railroad Company.

Atlantic City, N. J.—The Council has adopted a resolution refusing permission to the Atlantic City Street Railway Company to construct and operate a trolley line on South Carolina, Arctic and Rhode Island avenues.

Colorado Springs, Colo.—The new Manitou electric railroad will be operated from the plant of the Colorado Springs Company. It will not be operated as an extension of the Colorado Springs line, although the tracks will be continuous.

New York, N. Y.—At the Tuesday meeting of the Board of Aldermen a resolution was presented to the effect that the Rapid Transit Commission permit the Manhattan Elevated Railway to lay third tracks on its structure, as suggested by the experts in their report to the Commission. The resolution was referred to the Committee on Railroads.

Philadelphia, Pa.—George Lodge, as trustee for the E. M. Railway system, has purchased a large lot of ground at Twenty-fourth street and Sedgely avenue, fronting on the main line of the Pennsylvania Railroad, whereon to erect equipment works for the new underground electric railroad system. The price paid for the site was $20,000. Contracts have already been partly given out for the erection of the building. The main structure is to be of plain brick, three stories in height and 100 × 200 feet in extent.

Jefferson City, Mo.—Two street railway bills have been reported favorably by the house committee on railroads. One compels street railways to stop all cars within 10 feet of a railway crossing and to send the conductors ahead to see if the track is clear. The other requires electric railway companies whose wires cross railroad tracks to have them 22 feet above the surface, and to protect them with a wire netting, so that if they break they cannot fall across other wires.

Highland Park, Ill.—The Interurban Electric Railway Company is securing the right of way for an electric road from the Cook County line north to Fort Sheridan. The right has been secured through Highwood village and will be asked through Highland Park, and also of the county board at its session next month for the country part of the line. Eventually, it is believed, the road will, if built, become a part of the North Shore Electric line, that now stops at Evanston, 12 miles north of Chicago.

Brooklyn, N. Y.—The highway commissioners of the town of Jamaica have passed resolutions giving the Long Island Electric Railway Company permission to build, operate and maintain a surface railroad, to be run by electricity, on Cherry avenue, Fosters meadow and to and through private property from New York avenue to Springfield. The company was also granted permission to use cobblestones for paving, instead of granite blocks. It will also build a temporary bridge over the tracks of the New York & Rockaway Beach Railroad Company's tracks at Ozone Park.

Saginaw, Mich.—Saginaw & Bay City Electric Railroad Company has accepted the ordinance passed at the last meeting of the council. The work of grading will be commenced just as soon as the work can be laid out, men engaged, and the weather permits. The power house is to be erected midway between the two cities. The cars will seat 72 people. It is expected the running time between the cities will be 30 minutes, or about the same as is made by the railroads. The fare will be lower than that charged by the railroads.

New Brighton, Staten Island, N. Y.—The Board of Trustees has granted a franchise to the Staten Island Electric Railway Company, which is known and controlled by the Thomas Syndicate. In the franchise it is stipulated that the company shall within 60 days show that it is the owner of the old defunct Turnpike Company, and it is provided that the company shall deposit $10,000 as a guarantee. The Trustees also granted franchises to the Staten Island Interior Railway Company and the Staten Island Middleland Railway Company. These franchises require those roads to permit other roads, should they be organized, to have a terminal at St. George.

Milwaukee, Wis.—A trolley car loaded with passengers ran into an open draw on the Russell Avenue line of the Milwaukee Street Railway Company last Monday. There were 11 passengers in the car, four of them women. Hundreds of people were on the spot at once, and the people were fished out as fast as they appeared on the surface. The motorman, and two women, who were passengers, were drowned. Several of the passengers were slightly injured. The motorman, it is said, did not try to stop his car until within a few feet of the draw. He then set the brake, but the car slid into the river. It plunged headforemost on the ice and stuck there, half in and half out of the water.

Washington, D. C.—The House has passed the bill amending the incorporation of the Maryland & Washington Railway Company. The bill is an amendment to an existing charter extending the time for the completion of this road and arranging the manner in which it may enter the District. The road proper will be built in the State of Maryland, and will come into the District by way of Rhode Island avenue extended, the right of way to be acquired either by purchase or by condemnation. The road is to connect with the Eckington & Soldiers' Home line at North Capitol street. The bill to incorporate the Washington, Burnt Mills & Sandy Spring Railway Company was also passed. This is a railroad started in Maryland, coming into the District for the purpose of connecting with the Eckington or Brightwood road.

Kingston, N. Y.—Judge Parker has handed down a decision in the case of the Kingston City Electric Railway Company, which vacates the injunction forbidding the Colonial company to lay its tracks on Broadway, this city, between Cedar and Thomas streets, which was granted a year ago by Judge Herrick, on the ground that the laying of a track at that point would be in violation of the general street surface railroad law of the State. Judge Parker holds that in running diagonally along Broadway, from Cedar street to Thomas, the line will not be paralleling the track of the Kingston City road, and that to do this the consent of the plaintiff is not necessary. On this ground principally he vacates the injunction. It is understood the case will be appealed. The Colonial road is being operated in two sections, the injunctions of the Kingston City road and the West Shore Railroad having prevented the operation of the road as a whole. The Colonial company proposes to escape the West Shore injunction by tunneling under that company's tracks.

PERSONALS.

Mr. Hartford P. Brown, secretary and general manager of the Beaver Valley Traction Company, of Beaver Falls, Pa., has resigned his office after two years of unusually successful work in the service of the company.

Mr. Charles W. Hagar, for the last nine years general manager of the Royal Electric Company, of Montreal, has been appointed special agent in Montreal for the Guardian Fire and Life Assurance Company, of London, England. A few days ago the officers and employees of the company presented Mr. Hagar a handsome office desk.

Mr. Robert Laidlaw, president of the Laidlaw-Dunn-Gordon Pump Company, of Cincinnati, was elected treasurer of the National Association of Manufacturers, which convened at Cincinnati the third week in January. Mr. Laidlaw was one of the leading spirits in organizing the association, and much of the success of the convention was due to his executive skill and untiring energy. The delegation was banqueted at the new plant of the Laidlaw-Dunn-Gordon Pump Company.

TRADE NOTES.

Electric Heaters.—The Wallace Electric Company, of Chicago, has just closed arrangements with the Whittingham Electric Car Heating Company for the sale of its electric car-heater in the Western States. This heater is similar in appearance to a steam radiator, and consequently has a large amount of radiating surface. In reference to consumption of current, which is one of the principal points to electric railway companies the company states that the heater can furnish two variations of heat—that is, half and full temperature, taking, respectively, 3 and 6 amperes. It considers 6 amperes ample for severe weather, but with the system of distribution an arrangement can be made so that any amount of current that railway companies will be willing to expend in heat, may be absorbed.

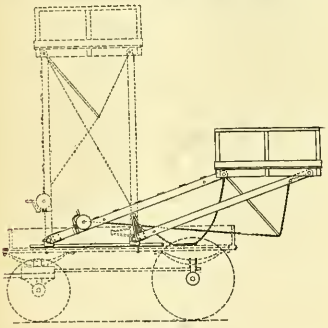
The Berlin Iron Bridge Company, of East Berlin, Conn., is building a large iron highway bridge, at Benton, Me. This bridge will be some 300 ft. long. The Farrel Foundry and Machine Company, of Ansonia, Conn., has decided to build a new roll and machine shop, and has placed the contract for the building with the Berlin Iron Bridge Company. The building will be 104 ft. wide and 260 ft. long. constructed entirely of iron. brick, and glass. The roof will be of copper. The Schenectady Gas Light Company, of Schenectady, N. Y., has placed the contract for its new gas house roof with the Berlin Iron Bridge Company.

RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued Jan. 29, 1895.

533,041. Car-Fender; Robert Atherton, Paterson, N. J. Filed Sept. 24, 1894. The fender consists of a stationary frame having curved sides grooved on the inside and a sliding frame arranged in the grooves. A netting covers the sliding frame, means being provided for holding the frame in normal position. A spiral spring connects the upper portion of the sliding frame with the lower portion of the stationary frame, and a stationary netting is arranged in the rear of the stationary frame with means for removably securing the stationary netting to the frame.

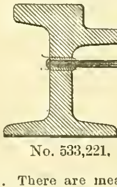
533,050. Safety-Guard for Cars; William B. Champlin, Jr., Oak Cliff, Tex. Filed May 22, 1894. Grooved brackets connect the sized outer frame with the car body and permit its endwise movement for folding and unfolding the guard. The inner, flexible frame is pivoted to the brackets and carries the guard apron. Chains support the forward end of the inner frame and have a yielding or spring connection therewith.



No. 533,059.

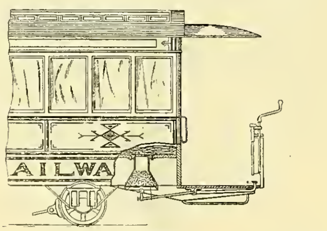
533,054. Brake for Railway Cars; Robert F. Cooke, New York, N. Y., Assignor to Edward Sandford, same place. Filed Oct. 22, 1894. Ropes are secured to both ends of a power spring and are connected to front and rear drums, revoluble on the axles. A pair of clutches engages the drums, and a lever operates the clutches. All are so constructed that when the clutches engage the drums, the ropes are simultaneously wound upon both drums to brake both axles.

533,059. Adjustable Wagon Tower; Silas E. Hartham, Worcester, Mass. Filed May 18, 1894. The wagon tower is provided with an independent horizontal bed-frame carrying hinging joints and arranged for resting upon and removable bodily from the floor of an ordinary wagon. There are means for detachably securing the bed-frame in position, and swinging standards having their foot ends attached to said bed-frame by the hinging joints are arranged. The platform is carried upon the top of the standards, and mechanism is mounted upon the tower-frame or standards for swinging the standards to upright or depressed positions, whereby the tower and wagon are completely separable. (See illustration.)



No. 533,221.

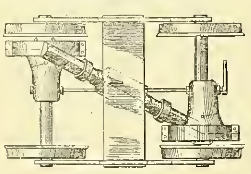
533,067. Life-saving Guard for Cars; William T. Lacon, Toronto, Canada. Filed March 8, 1894. The platform has a yielding top supported by springs and has an inclined wedge-shaped front of resilient material and a framework secured to the lower front part of the car by means of stays upon which the springs are supported. A buffer comprises a front of resilient material, and a back framework, a series of springs between the front and the back, and springs located between the dashboard and the back of the buffer. There is a staple at the back of the buffer and a bar secured to elliptical springs passing through the staple to admit of the longitudinal adjustment of the buffer.



No. 533,242.

533,096. Car-Fender; Hermann Stephan, Jersey City, N. J., and John Schutz, New York, N. Y., assignors of one-half to George F. Of and Julius Weinstock, New York, N. Y. Filed Sept. 15, 1894. The fender is hung on the end of the car and a bar is connected with the fender. There is a friction wheel on the car axle, a lever is pivoted to the under side of the car floor, above the bar and a pin projects from the free end of the bar through the car floor.

533,221. Bonding-collar. Milton M. Jacobs, New York, N. Y. Filed Sept. 12, 1894. The bonding-collar is provided with a coating of tin or similar substance, grooved or slotted longitudinally and threaded or roughened interiorly. (See illustration.)



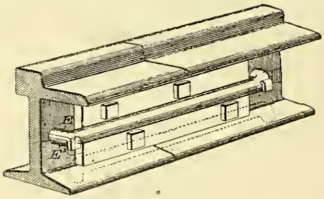
No. 533,259.

533,242. Track-sanding Apparatus. Martin S. Starkweather, Boston, Mass. Filed Nov. 23, 1894. 2. The sand receptacle on the car in front of a wheel and over a track has an opening at its upper end, outwardly inclined sides, an enlarged opening at its bottom and a destructible plate therein for closing the same. (See illustration).

533,259. Electric Locomotive. S. Lloyd Wiegand, Philadelphia, Pa. Filed Oct. 23, 1890. Toothed wheels having teeth of equal radial length are located in different vertical planes upon the bearing axles of the car and engage helical pinions upon the motor shaft diagonal to the planes of the toothed wheels. Friction clutches are located upon the bearing axles, and arranged to engage and disengage for rotative propulsion between the toothed wheels and exles. (See illustration.)

533,261. Bonding Device, for Electric Railways. John J. Zimmele and Antoine Bournonville, Philadelphia, Pa.; said Bournonville assignor to said Zimmele. Filed Nov. 30, 1894. The bond has limbs on the end thereof, and a kerf or slot extending in the limbs into the body of the bond or connector, whereby a wedging device may be inserted in said kerf or slot from either side of a rail or other conductor. (See illustration.)

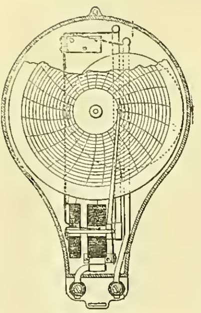
533,263. Safety-Guard for Street Cars; Andrew P. Anderson, Wilkinsburg, Pa. Filed Oct. 16, 1894. The fender is moved vertically by a lever and a continuous revolving net extends the width of the car having top and bottom rollers for its support. Shafts carry the rollers and mechanism revolves the shafts.



No. 533,261.

533,269. Recording Ampere-Meter; William H. Bristol, Hoboken, N. J. Filed July 26, 1894. Claim I. reads: "In an electrical measuring instrument, the combination of a stationary coil or solenoid, a movable coil or solenoid, two swinging conductors suspending said coil or solenoid from above and connecting with the terminals of the same, a swinging indicating or recording arm, and a connection between the movable coil and the indicating or recording arm on one side of its point of attachment." (See illustration.)

533,381. Car-Fender; John Taylor, Troy, N. Y. Filed Oct. 5, 1894. Claim II. reads: "The combination in a car-fender of the side fender bars the adjustable hangers suspending said bars from the journal boxes, the castings attached to the front ends of said bars, the flanged tubes connected to said castings, the casting connecting the front ends of said tubes, and the cushion fastened to said tubes; with the V-shaped frame suspended from the car body above the tubes, and the flexible apron connected to said tubes and frame, all constructed and arranged to operate."



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National Electric Light Convention. The next convention of the National Electric Light Association will be held next week in Cleveland. It will be seen from the programme, which is presented elsewhere in this issue, that many subjects of great interest will be read and discussed during the three days of the gathering. Several of the topics to be considered have fully as great an interest for the railway man as for those concerned in electric light stations. All indications give promise of a large attendance and the convention, without a doubt, will be one of the most enjoyable and profitable meetings in the history of the association.

Destruction of Car Houses. We have referred to the destruction of car houses by fire so often that the topic has become a hackneyed one, but the subject will always be timely so long as these structures continue to burn down at frequent intervals. In this issue two fires of this kind, involving a loss of at least one-quarter of a million dollars, are reported. In each instance the car house was burned with great rapidity, and the destruction of building and contents was complete. As we have frequently said, we believe it is a wise economy to build houses of this class in such a way that they shall be fire-proof or nearly so. The loss of property is bad enough, but the demoralization in the service that often follows of necessity a fire of this kind is even worse.

Prevention of Street Railway Strikes. Beyond a doubt the public should prevent by legislation, if possible, the great inconvenience, and even suffering, to which it is subjected by street railway strikes; but, while this is a conceded truth, the means by which this desirable end may be attained are not so apparent. It does not appear that any of the remedies thus far suggested is likely to be effective in this respect, except, perhaps, that of Judge Gaynor, who, it will be remembered, in an extraordinary decision in a mandamus proceeding recently, found that a street railway company must yield to its men, no matter how unreasonable their demands may be, if concession be necessary in order to prevent a strike. Most of the legislation proposed for the prevention of the paralysis of street railway traffic makes it necessary that the men shall give definite notice of their intention to stop work, and that the companies shall announce at a certain time in advance any proposed changes in wages, schedules, etc. These measures might prove desirable enough were there any means of enforcing their provisions. Their enforcement against a company is, of course, simple enough, but how can the men be coerced into going to work if they choose to remain idle? It will scarcely be seriously advocated that refusal to remain in the service of a private company shall be made a misdemeanor, but how else could the men be brought to terms if they wish to strike? Certainly, few of them are rich enough to satisfy a judgment obtained in a civil suit, so it would be useless to proceed against them to collect damages for their breaking contracts to remain a definite length of time in the service of a street railway company. It is possible that the trouble might be avoided by requiring employees to give bonds guaranteeing their contracts to remain with a company a certain length of time. This plan is also open to obvious objections, though it is more practical than most of the other means that have been suggested.

Collapse of the Brooklyn Strike. The collapse of the Brooklyn railway strike now seems to be complete. The leaders do not yet concede that the strike is over, for the reason that more money may come in and they desire to handle it, but no formal declaration can make any more certain the absolute failure of the strike. The strike received its death blow when rioting was commenced, when lawlessness was engaged in by the old employes and their sympathizers, and when the leaders at least winked at the disturbance. The men now are scrambling for such of their old places as are open to them, and when these are filled the great strike wil cease to interest the public. The effects of the strike will be many and far reaching. The worst sufferers, of course, will be the unfortunate men who allowed a pack of self-seeking adventurers to lead them into this hopeless struggle. That those who are unable to secure employment immediately wil now be promptly abandoned to their fate goes without saying. It is said in Brooklyn that many political hopes have been destroyed by the strike and Mayor Schieren is quoted as saying that his chances for political preferment are effectually killed. This remains to be seen. During the first few days of the disturbance in Brooklyn the Mayor's temporizing policy certainly shook public confidence in him, but latterly his vigorous denunciation of the sympathizers with disorder in the Board of Aldermen, and his determination that all disturbance should be promptly quelled, have done much to regain for him his place in public esteem. He ha determined to institute proceedings against a number of public officers who were negligent in thei duties during the strike, and very likely they, too will be among the sufferers. The incidents in th strike within the last week have been almost exclusively of a legal character. The most importan event was the attorney-general's refusal to sanctio a suit brought to annut the charter of the Brookly Heights Railroad Compony. This finding destroye the last hope of the strikers, but every one outside their ranks had anticipated it, as a contrary opinio would have been based necessarily on the assumption that the attorney-general would find that th State should visit penalties on a corporation b cause of its failure to perform certain duties whe the failure was due solely to the criminal acts its employees. The proceedings brought to ou two of the presidents of the roads also failed their purpose, and it now seems likely that th strikers have finished with the law, although son of the number may shortly appear in court to answ for crimes committed during the strike. and in t prosecution of these important cases it is earnest hoped that there will be no delay or lack vigor.

DINNER OF THE PRESIDENTS IN PHILADELPHIA.

The annual dinner of the Board of Presidents of the Philadelphia City Passenger Railway Companies took place last Wednesday evening. Johns Hopkins, president of the Hestonville, Mantua and Fairmount Passenger Railway Company, presided, and about 50 persons were present. The decorations of the room and tables were features of the occasion. On the front of the menu card there was an engraving of a trolley car, taken from a photograph of one of the cars of the Arch Street line of the Hestonville Company.

The guests included ex-Chief Justice Paxton, Philadelphia; H. H. Vreeland, president and general manager of the Metropolitan Street Railway Company, of New York; Spencer M. Janney, president of the Huntington & Broad Top Railroad Company; John G. Johnson, W. F. Harrity, Collector Read, General Louis Wagner, Senator George Handy Smith, Chief Bullock, of the Bureau of Highways; Coroner Ashbridge, ex-Select Councilman Thomas M. Hammett, Henry Bumm, Henry C. Moore, general manager of the Trenton Passenger Railway Company, formerly president of the People's Passenger Railway Company, of this city: H. A. Stevenson, also an ex-president of the People's Company.

There were also present Henry Croskey, Secretary of the Board of Presidents for 35 years and the only surviving original member; P. A. B. Widener, W. L. Elkins, Geo. D. Widener, D. W. Dickson, George W. Elkins, R. F. Bower and F. Uhlenhaut, Jr., of the Philadelphia Traction Company; George S. Gandy, Alfred Smith, Charles E. Ellis, Edgar Fries, M. W. Lipper, Charles S. Lincoln, Frank Weckerly, H. F. Potts, R. C. Brewster and Captain E. B. Ives, of the Electric Traction Company; C. F. Fox and D. C. Golden, of the People's Passenger Railway Company; Johns Hopkins, Isaac Blum and Simon J. Martin, of the Hestonville Company.

There were no set speeches. Remarks were made by Mr. Hopkins, ex-Justice Paxson, Mr. Vreeland, Mr. Harrity, Mr. Croskey and others, who talked in a humorous vein on street railway matters. Mr. Vreeland spoke of the Metropolitan street railway system in New York, and ex-Justice Paxson made some half-humorous, half-serious suggestions to the street railway managers present. He spoke of the prejudice against corporations, and declared that if the management of the various companies would make efforts to show the public that the companies desired to accommodate them in every possible way, and appreciated their patronage, there would be less of it. He also protested against the practice of allowing men to stand on the platforms of cars while there are seats and standing room inside, compelling ladies to crowd by them to get into the cars. Ex-Justice Paxson also spoke of the relations of the employees to the managers, saying that the antagonism of the men was often due to the policy of the management.

◆

CABLE RAILWAY MAIL SERVICE OBJECTED TO IN CHICAGO.

In a recent number of the STREET RAILWAY GAZETTE mention was made of the fact that a Trade and Labor Assembly of Chicago had adopted a resolution denouncing the plan of operating mail cars on the cable lines. A committee was appointed to present the matter to Postmaster Hesing and urge a protest against the new plan. When the committee called on Mr. Hesing one of the number asked if the cable mail service was not suggested by Mr. Yerkes to invoke the aid of the Federal Government in the advent of a strike of the employees of the cable lines. The postmaster said it was not, so far as he was concerned. The mail car was meant for the better efficiency of the service. The letter boxes on the cars had only been suggested; no action had been taken, and probably would not be. The mail cars, the postmaster said, would bring about a great improvement in the local service. All were interested, and none more so than the working classes, who had to depend entirely upon the postal service for the quick transmission of their letters. The introduction of the cars, he said, would give employment to more people.

◆

NEW YORK & BROOKLYN BRIDGE CABLE RAILWAY.

At a meeting of the trustees of the New York and Brooklyn Bridge held last Monday Chief Engineer Martin submitted a report showing that $214,413 was still to be provided for to complete the terminal improvements. The estimate of the cost accompanying the expert's report was $1,500,000, and the present estimate is $2,041,913. The original estimate for the cable-driving plant was $50,000, and the cost is now estimated at $198,455. In regard to the increased cost of the plant Mr. Martin says: "The estimated cost of extending the cable-driving plant, as first made, only covered those additions which then seemed imperative, but not all that since has been found to be requisite to fully satisfy future demands and meet all possible requirements, and to insure the certain and efficient operation of the railroad. These have been provided for, and are covered by this estimate. Nearly all the work is done, the estimate to complete being only about $6,000." The report for January showed that the total decrease in receipts, as compared with December, was $2,503.15. The daily average of passengers over the bridge decreased 2,538. The total receipts for the month were $303,495.63, and the expenditures were $83,400.55, leaving in the treasury $220,095.08. More passengers passed over the bridge Saturday than on any other day since it was opened. The next best record was on Centennial Day, October 12, 1892. It is estimated that 224,500 persons were carried over the bridge Saturday. The number carried over October 12, 1892, was 223,600. The receipts Saturday were $6,185.76, whereas on Centennial Day they were $6,467.40. They were less Saturday because a greater number of excursion tickets was sold. It is estimated further that during the two busiest hours on Saturday morning over 60,000 persons were carried across, or 500 a minute.

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TROLLEY SYSTEM FOR LONDON, ENGLAND.

The London United Tramways Company, which recently acquired the undertaking of the West Metropolitan Tramways Company, is petitioning for permission to introduce the overhead trolley system on the double line of tramway it is authorized to construct in substitution for the existing single line in Uxbridge Road, between Shepherd's Bush Green and Acton. The Hammersmith Vestry, before lending its approval to the scheme, sent a large deputation to Havre to inspect a similar system in operation there. The deputation returned with a favorable opinion, and the Vestry unanimously gave its consent to a report recommending the adoption of the trolley system. It remains to be seen whether the County Council will also approve. J. Clifton Robinson, managing director of the company, recently made the following statement regarding the enterprise:

"One mile only lies within the county of London, the remaining mile and a half being under the jurisdiction of the Acton Urban District Council. This will be the inauguration of the electric trolley system into London, the demonstration of which will give the London County Council an opportunity of being in touch with the best system, and of judging how far it may be applied to the lines it intends to acquire and work. In our own case the capital outlay is larger than we should have to make for horse traction, but we are confident that the working of the line will be at a lower percentage. The company undertakes to pave the roadway with Jarrah paving blocks, to equip the line with new and improved cars, electrically lighted, which will travel at an accelerated pace, more frequent intervals, and at lower fares, no increase being made on Sundays or bank holidays, and to allow the local authorities the free use of the standards for electric lighting purposes. The company also expresses its willingness to agree to a clause empowering the Council to call for the removal of the electric installation if, after reasonable trial, it is not proved to be the boon to the public which it has been demonstrated to be in the places where it is now in operation."

◆

TO LIMIT CAR SPEED.

Assemblyman Wieman, of Brooklyn, has introduced a bill in the Assembly to limit the speed of electric cars in large cities. Its provisions are as follows:

None of the cars of any street surface railway company operated in any city of the State, having more than 500,000 inhabitants, and which shall be propelled by the system of electricity known as the trolley system, shall be propelled or operated at a greater speed than at the rate of eight miles an hour.

The Board of Railroad Commissioners is authorized and directed to make such rules and regulations, and shall cause to be adopted such devices as shall tend to secure the limitation of such rate of speed and to afford evidence if greater speed be obtained, and all street surface railway companies in said cities operating cars so propelled shall conform to and carry out the rules and regulations so made, and shall place upon the cars any devices that may be so adopted, but no company shall be required to use any particular patented device.

Any violation of the provisions of this act, and any violation of any such rule and regulation, or any failure to apply and adopt such devices by said company, or by any of its officers, agents or employes, shall be deemed a misdemeanor, and in any action which shall be brought to recover damages for injury to person or property, such violation or failure shall be prima facie evidence of negligence by the company.

This act shall take effect immediately.

◆

TWO CAR HOUSES BURNED.

The car barns of the Lincoln avenue cable line of the North Chicago Street Railroad Company, Chicago, were burned last Wednesday. The flames originated in some oiled rags, and spread with such rapidity throughout the barn that it was found impossible to remove more than a few of the cars, which had all been run in for the night. Of the 120 passenger and grip cars stored in the barn but nine were saved.

The firemen managed to confine the flames to the storage barn. During a part of the time there was grave apprehension lest a tank containing 35,000 gallons of crude petroleum which the company uses for fuel should become ignited, as it was but a few feet from the burning barn. The fire was under control, however, before the tank had become heated. The total loss on the building and cars is estimated at $250,000. The insurance is said to be $125,000.

Fire totally destroyed the car-house of the Newton & Boston Street Railway Company, on Walnut near Homer street, in Newton, Mass., on Feb. 13, together with a large number of cars. The fire spread so rapidly that when the fire apparatus arrived the entire building was in flames. At least 35 cars and 6 large closed cars were destroyed. The total loss is estimated at $40,000, with partial insurance.

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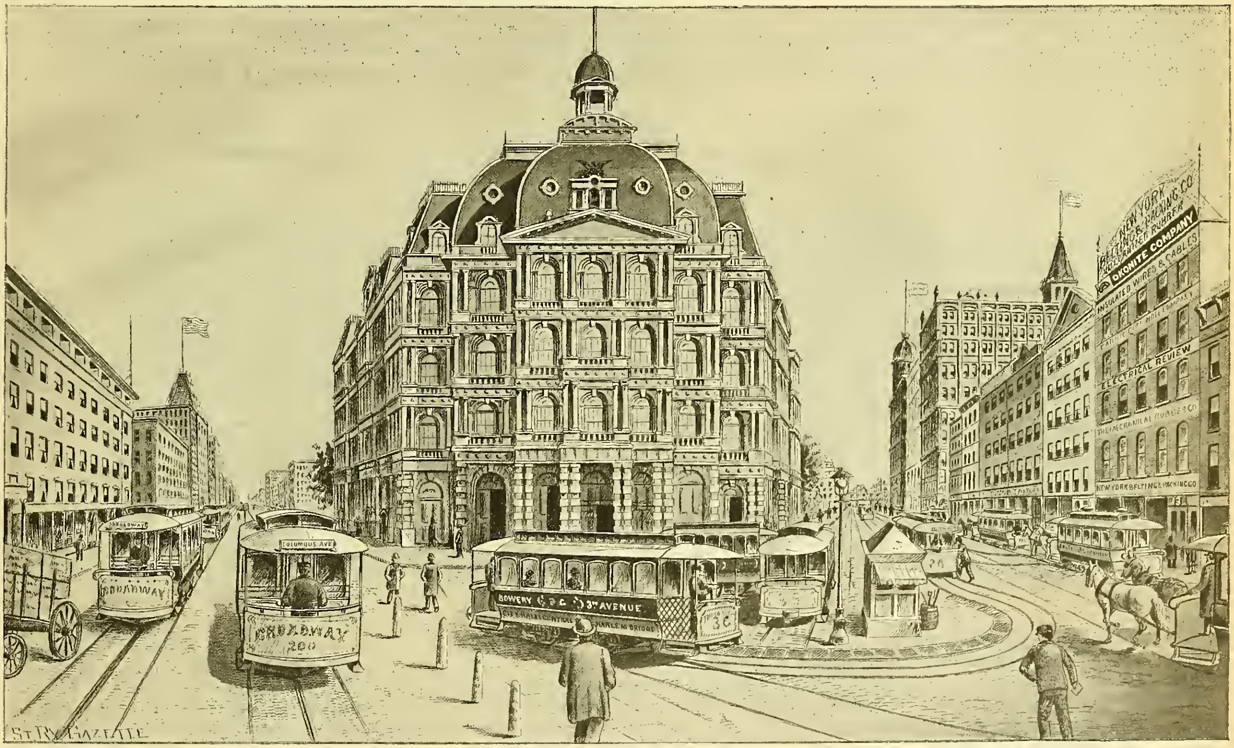
LAYING OUT RURAL TROLLEY LINES.—Trolley roads are being extended through the State at a great rate, and very soon various links will be united to make long routes, and then will come the temptation to run express trains. Although it would not be desirable to give them the right of eminent domain, a law could be enacted authorizing township authorities to widen roadways for the accommodation of electric railroad tracks, the expenses to be paid by the companies making use of the improvement. It is probable that in a very short time every highway in the State for which permits can be obtained will be occupied by trolley lines; but the State cannot afford to allow this to be done, except under terms and conditions that shall preserve a just part of such roads for general traffic. The subject of grade crossings also needs regulation by State law.—*Philadelphia Public Ledger.*

POST-OFFICE SQUARE, NEW YORK.

From a street railway point of view there is no locality in New York more interesting than Post-Office Square, at the junction of Broadway and Park Row, represented in the accompanying illustration. Here is the busiest street railway spot in the city. Standing in front of the Post Office a person can count at least nine cars a minute passing him. The Broadway cable cars travel in each direction at intervals of 30 seconds. The Third avenue cable cars, which follow the loop shown in the foreground, have about the same headway. The Madison and Fourth avenue horse cars, one of which is to be seen just at the left of the electric light post in the foreground, run at scarcely greater intervals. The other lines which terminate in front of the Post Office are the Avenue B line and the East Broadway and Grand street line. There are three other lines that may be considered as centering at this point, although they are not represented in the engraving. These are the Sixth and Eighth avenue lines, terminating on Vesey street at Broadway by the Astor House, which is shown at the left of the engraving; and the Bleecker street line, that turns from Park Row into Beekman street, which is the first street at the right in the engraving.



POST OFFICE SQUARE, NEW YORK.

While it has been said this is the most interesting street railway locality in New York, the interest centers in the extreme activity of the place. With the exception of the Broadway and Third avenue cable lines all the street railways to be seen here are operated by horses. These must of necessity disappear within the next few years, and mechanically operated cars will take their place. It is too soon to predict what system will be adopted, but it is fair to assume that overhead wires will not be allowed in the district.

The construction loop which the Third avenue cable cars follow was an interesting and difficult piece of engineering. Three cables are run from the lower station at Bayard street for service between Bayard street and the Post Office. Two of these are high speed cables, and are for use by the cars until near the entrance of the loop, or to a point about opposite the Times Building on Park Row. Here is located a rope transfer, and thence the high speed cables on the down track are carried through a blind conduit around an end sheave 15 ft. in diameter, returning by a second conduit to the rope transfer, where they are picked up by the cars. The Post Office loop, which is operated by the slow-speed cable, has a radius of 41 feet, the entrance curve being of 50 feet, and the exit curve 41 feet radius, respectively. The diameter of the curve pulleys is 33⅝ inches, and there are thirteen on the entrance curve, forty-two on the main loop, and seven on the exit curve. All the wheels in the loop have gimbal bearings.

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RECOMMENDATIONS OF THE CORONER'S JURY IN MILWAUKEE.

The coroner's jury in Milwaukee, which investigated the deaths of three persons caused by the plunging of an electric car into the Kinuickinnie river through an open draw, brought in the following verdict:

"We find that Antoinette C. Ehlman, Kate Schmittkunz and John Kennedy came to their death February 4 by reason of the negligence of Motorman John Kennedy of car No. 145, Milwaukee Street Railway Company, in not stopping his car at the distance of 50 feet from the Kinnickinnic river bridge, and in not holding his car under proper control in approaching said bridge when the accident occurred. The jury would recommend and urges that all electric street railway cars for use in Milwaukee during the winter season should be provided with vestibules for the protection of the motormen in extreme cold weather and storms, as it believes from the evidence that the neglect of duty on the part of the motorman in this case was due to a great extent to his being greatly exposed to the severe cold at the time in question. The jury would also recommend that the conductors on electric cars should not be permitted to leave their cars at railroad crossings or at the approaches to bridges, and that the street railway company should be required to provide a guard at each crossing and a strong, movable gate or bar at the approach to bridges over rivers. The jury would also recommend that the company be required to have some officer or employee of the company whose duty it shall be to examine daily each car before allowing it to be used, and also to see that the same is in good repair and properly equipped in all respects."

EXAMINATION OF MOTORMEN AND CONDUCTORS FOR SIGHT AND HEARING.*

By Wheelock Rider, M. D.

My examination of motormen and conductors employed by the Rochester Railway Company begun in December, 1894, is not at present completed. I very gladly comply with your request for a detailed description of the methods and results. Motormen and conductors are given the same examination; the blanks, with each point duly noted, are filled for reference and a certificate for each man is returned to the company's superintendent. The employee's age and previous occupation are recorded, both obviously bearing in a general way upon his acuity of sight and hearing at the time of the examination and giving valuable hints as to what may be expected in the future. For example, the hearing of a man who has worked for any considerable length of time in a boiler shop is regarded with suspicion and tested with more than ordinary care. Again, the vision of an employee who is found to be slightly oversighted at the age of 35 becomes suspicious and demands re-examination at 40. As the simple test for acuity of vision would not discover this defect, a special test is made to show the degree of oversight, as this may become a matter of moment as age advances. Direct visual acuity is tested by having the employee read a series of specially selected test letters, decreasing in size and illuminated by electric lights of known candle power. Four degrees of illumination are used and thus is practically determined the man's ability to see persons and objects at dusk or in dimly lighted places. This test is, so far as the writer knows, novel, and, it would seem, important, for individual peculiarity in the degree of ability to recognize dimly lighted objects is marked. The degree of vision in each eye being noted, the field of vision in each eye is examined. The man examined being asked to look steadily at the examiner's face is required to count fingers when held above, below, to the right and to the left.

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* A communication addressed to the New York Board of Mediation and Arbitration.

It is not generally known that this indirect vision is of greater value than the ability to see objects upon which the eyes are fixed. The safety of the public requires that, while watching for a clear track, the motorman shall see, in time to avoid danger, any pedestrians or teams approaching from either side. No extraordinary sharpness of direct vision can compensate for a contracted field. Next comes the objective examination of the eyes, both as to their external and internal structure, the latter with the opthalmoscope—peculiarities being carefully noted. The hearing is tested with a stop watch of known audibility. The man examined is also required to point out the location of muffled telegraphic sounders which are set up in various parts of the examining room. The ability to properly locate sounds bears somewhat the same relation to the hearing that the field of vision does to the direct vision. Objective examinations of the ears follows, the condition of the external auditory canals and drum membranes being duly recorded.

The combination of subjective and objective examination renders deception practically impossible, and those to whom certificates have been given may with certainty be assumed to have (1) normal direct vision in one eye, and at least one-third normal direct vision in the other eye in dim and full illumination; (2) a normal visual field, including about 180 degrees of the horizontal plane; (3) the use of both eyes together, and (4) normal hearing in one ear and one-third in the other ear, with good sense of direction of sound.

All applicants for positions as motormen or conductors are required by the company to pass the same examination, it being the aim to select those with the most perfect sight and hearing. It is interesting to many to learn that an intelligent man may be decidedly deficient in any one of these requirements, without knowledge of his defect, and the natural desire to avoid trouble, into which a dangerous occupation might plunge him, cannot be depended upon by corporations to prevent such imperfect individuals from seeking and obtaining employment unless a check in the form of a carefully conducted examination be interposed. Seven per cent. of the men examined have failed to pass and have been relieved from duty. A list has been kept of such men as, although at present within the required limits, may on account of advancing age or progressive defect, require re-examination, it being the aim of the company not only to secure, but to preserve, their high standard of service.

I would emphasize the point that not only is the safety of life and limb increased by such thorough examination, but many little annoyances to the public are diminished. Conductors who both hear and see and motormen who see and hear quickly, accurately and under difficult conditions, surely diminish very markedly the dangers and enhance the value of rapid street transit.

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STREET RAILWAY LEGISLATION IN INDIANA.

The following street railway measures have been introduced in the Indiana legislature:

A bill requiring that electric motor cars used during the months of November, December, January, February and March shall be vestibuled. The bill has been engrossed and will become a law.

A bill requiring street railway companies in cities of more than 100,000 inhabitants to pave between the tracks. This law is aimed at Indianapolis alone.

A bill providing that, unless two-thirds of the property-holders on a street shall so petition, no street railroad company shall be allowed to build a road in any street nearer than the second street from a street on which a street railroad track is already laid.

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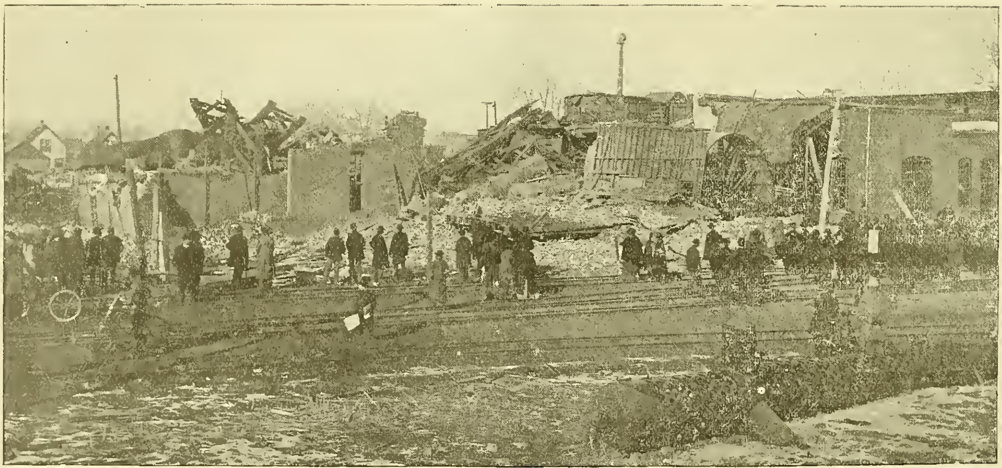
BOILER EXPLOSION IN THE GRAND AVENUE POWER STATION, DENVER, COL.

A boiler explosion occurred January 30th in the Grand Avenue power station of the Denver Tramway Company, causing the death of two employees, the injury of several others, and the wrecking of the entire plant.

The direct cause of the explosion is still undetermined. The boilers, 12 in number, were of the horizontal tubular type, 125 H. P. each, built by the Variety Iron Works, of Cleveland, and were provided with Murphy stokers. The boilers, it is said, were all directly connected, and the explosion of one was followed by that of the others in succession. The electrical equipment of the station consisted of 12 Thomson-Houston 80 H. P. and 2 M. P. 400 H. P. generators.

The circuits fed from this station have been connected with the other power stations of the Denver Tramway Company, and traffic was only temporarily interrupted. The damage caused by the explosion is estimated at $100,000. The engraving for which we are indebted to the *Electrical Engineer*, of New York, gives a view of the wrecked buildings taken immediately after the explosion.



VIEW OF THE GRAND AVENUE POWER STATION, DENVER, COL., AFTER THE BOILER EXPLOSION.

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SPEED REGULATION.—The attempt to regulate by law the speed of electric cars will not meet with popular approval. The trolleys were mainly established to benefit suburban travel, and while speed may be properly limited in crowded places, the attempt to regulate it in thinly settled localities would not do justice to the railroad or the passengers.—*New York Evening World.*

PHILADELPHIA FENDER ORDINANCE.

The Street Railway Committee of Councils of Philadelphia, which has for months had under consideration the matter of street railway regulation, has finally decided to report favorably an ordinance requiring fenders on electric cars. The measure requires that within 90 days after the passage of the ordinance it shall be unlawful for any company to run electric cars unless each car is "provided with a safety guard or fender, constructed in such a way as to protect the limb and life of any person who may come in contact with said car." Failure to comply with the ordinance within the specified time will subject the offending company to a fine of not less than $10 for each day each car, unequipped with a fender, is run. After 30 days have expired the fine is made $40 a day for each car.

The report of the committee states that two trials of fenders have been witnessed, and the committee is satisfied that it is possible for the railway companies to select from among the number tested several that will answer the purpose of protecting life and limb. The committee does not deem it advisable to recommend the adoption of any particular patent or fender, as it thinks the companies are best qualified to decide as to the character of a fender which will lessen accidents.

The street railway committee also agreed to report favorably an ordinance regulating the stopping of trolley cars at street crosssings. It provides that 10 days after the passage of the ordinance all electric cars shall be required to come to a full stop on the near side of all principal or main streets paved with asphalt or other improved pavement, or when occupied by other street or steam railroads, in the territory between York street and Washington avenue and the Delaware and Schuylkill rivers. It is provided, however, that the ordinance shall not apply between the hours of 12 midnight and 5 A. M.

The same ordinance established a new right of way for electric cars by providing that cars going north shall have the right of way in crossing streets over those going east, and cars going west the right of way over cars going south. A penalty of $10 is fixed for violations of the ordinance to be paid by the companies. The present law gives north and south cars right of way.

At a hearing on the ordinance, J. Levering Jones, representing the People's Traction Company, and David H. Lane, representing the Philadelphia Traction Company, opposed the ordinance.

Mr. Jones said that under an agreement entered into by all the companies, the trolley cars were now stopping on the "near" side of the streets. Every railroad, he said, was anxious to operate its road without accidents, and desired to secure every passenger it could, but he claimed it was a waste of time to come to a full stop when there was no one to get on or off the car, and, moreover, a very small percentage of accidents took place at street crossings. At crossings where the cars, under the present arrangement, did not come to a full stop, they slow up sufficiently to avert danger. Mr. Jones said the ordinance did not tend to promote public convenience and did nothing for public safety. The proportion of accidents to the hundreds of thousands of people carried every day was decreasing, due to the education of the public in the use of trolley cars, and the education of the motormen and conductors in their operation.

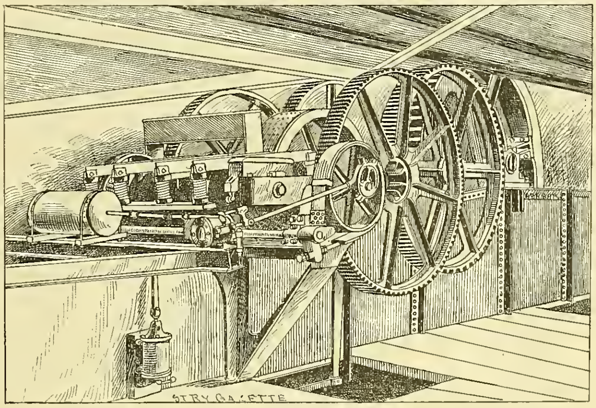

FIG. 2.—MECHANISM FOR OPERATING THE ROLLING LIFTING BRIDGE.

Mr. Lane said that two or three months ago, when the ordinance was introduced, the committee said the ordinance would be passed unless the companies agreed to a uniform system of stopping. In order to make uniformity, Mr. Lane said, the People's Company yielded its convictions that the "far" side was the better. The agreement was made with the understanding that the bill would not be passed.

The committee made a concession by inserting the limits already noted, and mentioned the agreement referred to, saying that, in view of the fact that there was no legislation which required the companies to adopt such a plan, it deemed it expedient to make it obligatory to stop.

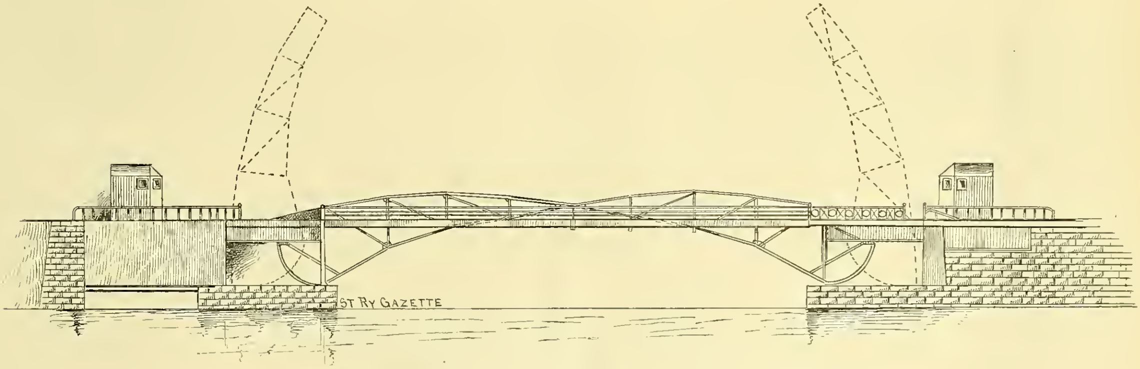

FIG. 1.—ROLLING LIFTING BRIDGE OVER THE CHICAGO RIVER.

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Electric Railway Legislation.—Of all the measures introduced in the Legislature this session none have attracted so much attention as those relating to the reform of the trolley. And only about one per cent. of such reforms will ever again be heard from. Most of them are vague and trivial in character, apparently designed to compel street-car corporations operating lines by electricity to go to every form of inconvenience by adapting devices that are of problematical value, to say the least.—*New York Evening World.*

ROLLING LIFTING BRIDGE OPERATED BY ELECTRICITY.

A bridge of exceptional interest has recently been opened for traffic in Chicago. It spans the South Branch of the Chicago River at Van Buren street, and the peculiar motion of the bridge in operation has given to it the name of the "rolling lifting bridge," as each half the bridge when it is to be opened rolls backward and upward on a segmental girder at its base, assuming the position indicated by the dotted line in Fig. 1. The conditions to be met by the bridge were unusual. The old swing bridge at this point divided the river into two narrow channels, neither of which was in direct line with the channel above or below the bridge. A new swing bridge, even if of longer span, would not have materially improved these channels. Moreover, the Metropolitan West Side Elevated Railway wished to cross the river at a point near this bridge, which would not have been possible if the old bridge were replaced with a swing bridge of longer span.

The new lift bridge moving in a vertical plane permits the Metropolitan "L" road to cross the river as desired, and, having no centre pier, a straight channel can be maintained.

Fig. 1 gives a side elevation of the bridge. As shown, the bridge is closed ready for traffic, the dotted lines indicating the position of the bridge when fully opened. The west approach is longer than the east—the abutment and pier on the west being separated by 40 feet, while on the east they are combined in one piece of masonry.

This space between the abutment and pier is bridged over with plate girders, and forms a room for the machinery on the west side. On the east side of the river space for the machinery was provided by building a room in the abutment. In each room are placed the motors, air pumps, air reservoirs and other machinery necessary to operate one-half of the bridge, and each half is operated independently of the other.

The foundation for each part of the substructure is formed of piling, driven about three feet from centres. The piles used were about 50 feet long, driven nearly to the water and sawed off 17 feet below the water line.

In building the masonry for the west abutment the west pier, and the pier portion of the east abutment, open caissons were used. The bottom of the caissons consisted of four courses af 12x12 pine, and the side walls of a single course of lumber. Each caisson was built at dock and filled with concrete until it sank almost to the level of the piling. It was then floated into position and the concrete continued up to within two feet of the water line. The pier was then faced up with Bedford masonry to the coping, the concrete backing for each course being put in before the following course of masonry was added. The coping was of large blocks of Bedford stone. In each pier were formed three pockets, each to receive one of the tail girders of the movable portion of the bridge when revolved into the vertical position. One of these pockets is shown in the section of the west pier. Directly upon the masonry of each pier were placed three very heavy castings, each of which forms the bearing for one segmental girder

When the bridge is raised, the floor of the movable part of the roadways passes back and beneath that on the approach, making it necessary to bring the latter to a very thin edge to form a connection when the bridge is closed. The movement at the sidewalks is the reverse of the above, that is, the moving sidewalk passes above the fixed part as the bridge is raised. From the machinery runs an operating strut joined to the center truss by a pin connection. Within this strut is a rack which engages with the rack wheel. At the time the strut is in the first position, the latch beneath the tail girder and the pin latch at the center of the span are both in position and the bridge is locked ready for traffic. The first movement of the strut backward is to revolve the cam crank, which operates on a series of levers and shafts, withdrawing the pin latches. At the same time the small wheel strikes the cam of the rack wheel, and the first movement of this latter wheel, operating through the small wheel and the connecting levers, is to withdraw the latch from the tail girders. These two duties performed, the bridge is free to move and the succeeding motion of the operating strut begins to move the bridge. In closing, these movements are simply reversed and the bridge is again locked.

There is only one set of machinery and one operating strut, these being connected to the center truss. Each truss is locked in the same way as the center one. As previously stated, the lock at the center is only to prevent lateral movement. The arm to the center acts as a cantilever, and the tail girder, being the anchor, is held down by heavy anchor rods reaching to the bottom of the masonry. The bridge to the approach acts as a simple span, being supported at the approach by the tail girder hangers.

In raising the bridge, the power from the operating strut is carried from the center truss to the two outside trusses by heavy vertical bracing between the posts. Within the tail girders and between them, beneath the roadway floor, are placed the weights for counterbalancing the bridge. These weights are sufficient to prevent the bridge from coming to a horizontal position when freely lowered by the brakes. The bridge, when so lowered, comes to rest a little above the horizontal; the current is then applied and the motors force the bridge down to a level.

The machinery and motors are shown in Fig. 2. There are two 50-H. P. motors on each side of the river, hung on the same shaft, and wired to operate together or singly. On each end of the motor shaft is an automatic brake wheel. The brakes on these wheels are operated by compressed air, the air compressors being operated by an eccentric on the end of the motor shaft. If at any time during the motion of the bridge the current is cut off, these brakes are automatically applied. In addition to the brakes, there is an emergency brake on the center of the first shaft, back of the motor shaft, which may be set at any time by opening an air valve leading from the air reservoir to this brake cylinder. This brake is intended to be used only in case of an accident.

The bridge gates on the right hand roadway at each end of the bridge, and the signals at the center of the span, are also operated by compressed air. The air for use on both sides of the river is compressed on the west side; that to be used on the east side being piped across beneath the river and stored in a reservoir.

Of the machinery shown in Fig. 2 the gear wheels are all of cast steel, excepting the spokes and hub of the rack wheel, which are of cast iron, as are also the journal-boxes. On top of the center girder on each approach is located the operators' house. To each of these houses run all electric cables and all air-pipes for controlling one-half of the bridge; the operator having here before him all the apparatus for the complete control of one-half of the bridge.

The bridge was designed and patented by Mr. Wm. Scherzer, who died before the drawings for it were entirely completed. It may safely be said that had he lived to carry out the work he had so well begun many improvements would have been added.

Work was begun on this structure early in 1894, and the bridge was opened for traffic a few weeks ago.

The substructure was built by the Fitz-Simons & Connell Company, of Chicago. The east pier and abutment, which came between two seven-story buildings, and the excavation for which was considerably below the foundations of these buildings, was especially difficult of construction. This work was all done very successfully and with credit to the contractors.

The contract for the superstructure was originally let to A. Gottlieb & Co., but Mr. Gottlieb's death very soon afterward made it necessary to re-let this work, and it was given to Mr. Charles L. Strobel, of Chicago. Mr. Strobel had the work manufactured by the Elmira Bridge Company, of Elmira, N. Y., who sub-let the machinery to the Scaife Foundry & Machine Company, of Pittsburg.

The electric equipment, including the brakes, air compressors, gates, signals, etc., was furnished by G. P. Nichols & Brother, of Chicago. The bridge was constructed under the supervision of Samuel G. Artingstall, City Engineer; Warren R. Roberts, City Bridge Engineer, having direct charge of the work. The total cost of the bridge, including the approaches, the electric equipment and cables to the power house, was $169,700.

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Trolley Cars in Storms.—The electric surface railways could scarcely have been subjected to a severer test than was furnished by the recent storm, which was hardly excelled in severity by the famous blizzard of March, 1888. In all fairness it must be admitted that they stood this severe test extremely well, completely demonstrating the superiority of electricity as a motive power in a driving winter storm to either horses or cables.—*Philadelphia Times.*

REPORT OF THE ARBITRATION BOARD ON THE BROOKLYN STRIKE.

The New York State Board of Mediation and Arbitration last week submitted to the legislature a second report on the Brooklyn street railway strike. It summarizes the results of the investigation made in accordance with a special resolution of the Legislature. An abstract of the report is presented herewith:

"The additional inquiry failed to throw any new light upon the cause of the strike, which, in a word, was the direct consequence of the inability of the officers of the roads and the executive officers of the employees embraced in District Assembly No. 75, Knights of Labor, to renew for 1895 the contract of 1894 between them, with certain amendments proposed by the latter. This disagreement of the employers and employees, however, was but an apparent or superficial cause—an effect rather than a cause. The primary cause of this Brooklyn strike and of all kindred strikes is to be found in the fact that the Legislature, in creating railroad corporations and vesting in them the public function of transporting persons and property of the people, has neglected to make necessary provisions for a stable and efficient service of operating forces upon the lines to subserve the end for which they were given breath of life and clothed with the State's power of eminent domain."

The testimony of the officers of the several Brooklyn street railways, and that of the strike leaders, as taken by the board, is referred to, and a long communication from C. M. Wicker, president of the Brooklyn, Queens County and Suburban Street Railway Company, who was prevented by illness from attending the meeting of the board, is presented. In answer to one of the board's questions, Mr. Wickser remarks:

"You also ask our opinion as to what recommendations, if any, should be made by your board to the Legislature, looking to the prevention of strikes among employees of corporations engaged in serving the public, so that the public may not suffer the serious inconvenience experienced, to say nothing of the riot, lawlessness and expense so forcibly brought to our attention the past two weeks. This is a serious question, but, upon the hypothesis that transportation of freight or passengers should not be interfered with or cease, we believe there is a solution contained in the following suggestions:

"First—Employees of corporations engaged in transporting passengers or freight shall give 10 days' notice of their intention of leaving the service.

"Second—That such corporations may decline to accept, during any one day, the resignations of more than five per cent. of the total number of persons employed in any one department.

"Third—That such resignations shall be accepted in the order made.

"This will enable the entire force of any and all departments to leave the service of any such corporation every 30 days, and will, at the same time, compel the corporation to employ, if it can, new men for but five per cent. of its entire force on any one day."

The report follows:

"Any remedial legislation, to be effective, should have prevention for its objective point. The interruption of operation of a railroad in its service to the people for which its corporate owner was created by reason of a controversy or dispute between the company and the operating forces or strike of the latter should be made impossible. The measure recommended by this board is one that would bind alike in mutal obligations both both employer and employee in outline as follows:

"1. Declare the service of railroad corporations created by the state a public service.

"2. Entrance into such service to be by agreement for a definitite period upon satisfactory examination as to mental and physical qualifications.

"3. Resignation or dismissal from such service for ordinary cause to be permitted, to be stated in writing and filed with some designated authority, and to take effect after the lapse of a reasonable and fixed period, with proviso for summary resignation or dismissal for extraordinary cause to be stated and filed in like manner.

"4. Wages to be established at the time of entry, and changed only by mutual agreement or decision by arbitration of a board chosen by the company and employees, or by a State board, or through the action of both, the latter serving as an appellate body. Other differences that may arise to be settled in like manner.

"5. Promotions to be made upon a system that may be devised and agreed upon by both parties, with the aid of a State board, if necessary.

"6. Any combination of two or more persons to embarrass or prevent the operation of a railroad in the service of the people a misdemeanor; and any obstruction of or violence toward a railroad serving the public, endangering the safety of life and property, a felony with punishment of adequate severity.

"7. Establishment of a beneficiary fund for the relief of employees disabled by sickness or accident and for the relief of their families in case of death, as is done upon the lines of a number of railroad corporations in other States.

"8. Membership in a labor union shall not be used as a bar against the employment of competent workmen by a railroad corporation created by the State.

"All to the end of a discharge of mutual obligations of railroad corporations and employees, the enjoyment of mutual benefits and the securement of a permanent and satisfactory service to the people, who have a right to it and a right to use every power necessary to obtain it.

"It is confidently believed that a law enacted on the lines of the measure above suggested would 'insure relief and justice to all.'

"A point of very great importance in the operation of railroads, and especially of electric street railroads in the congested streets of cities, is that of sight and hearing in motormen and conductors. The Brooklyn Daily Eagle Almanac for 1895, just issued, states that the trolley roads have been in operation in Brooklyn between two and three years, and that during that period more than 600 accidents have 'been reported, and it would probably be conservative to add 150 to that number.' The number of people killed up to the first of the year 1895 is stated at 91, and the State Railroad Commission is reported as stating the number killed during 1894 alone at 45. It is believed that many of these accidents and fatalities are directly traceable to imperfect vision in motormen. That the managers of trolley roads are sensible of this fact is evidenced by the action several months ago of President Beckley, of the Rochester Electric Street Railway, which is conceded to be one of the best managed and most efficient of this class of railroads in the United States, in ordering an examination of conductors as to sight and hearing by Dr. Wheelock Rider, an eminent oculist and aurist of Rochester, and making provision for such examination of all applicants for places before employment in the future.

"It is suggested that aside from other legislation touching the operation of railroads this one point of the faculties of seeing and hearing in the operating forces, as to positions where seeing and hearing are essential, ought to be covered by requirement of statute for examination by a competent oculist and aurist before applicants are taken into the railroad service. Information has been received that men dismissed from service on the Rochester road on account of defective vision, and having found employment on the Brooklyn, is without question."

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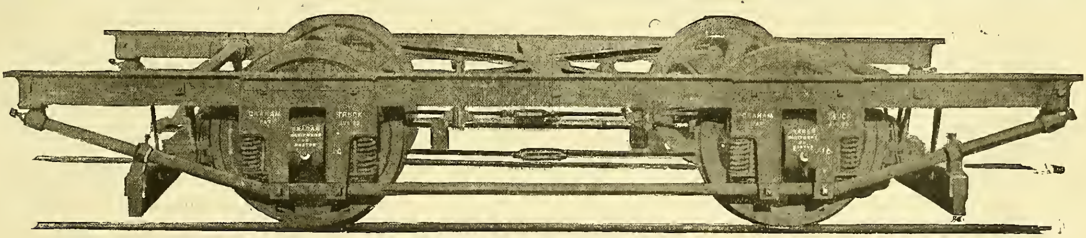
Connecticut Grade Crossings.—There has been loose talk of a possible conflict in the General Assembly between electric and steam roads; perhaps such a situation will develop, though nobody yet appears wise enough to see how it can come. But surely the extinction of these grade crossings is equally for the interest of both roads. The passenger on the electric car is as likely to be killed as the man on the steam car when the crash comes. And come it surely will if the two tracks cross at grade.—*Hartford Courant.*

GRAHAM I-BEAM TRUCK.

The new low down I-beam truck, constructed by the Graham Equipment Company, of Providence, is illustrated herewith. The strong points claimed for the truck are that it is entirely spring suspended, and the top of the I-beam is 24 inches from the ground when the car is fully loaded. This construction makes a very comfortable step for passengers embarking or alighting, particularly elderly men and women, passengers in feeble health, and women who have children in charge. The truck has but 20 bolts, is made of malleable iron and steel, and is equipped with the new equalized brake rigging. The truck weighs but 3,200 pounds, and it embodies desirable qualities required by street railway officials.



GRAHAM I-BEAM TRUCK.

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NATIONAL ELECTRIC LIGHT CONVENTION IN CLEVELAND.

The annual convention of the National Electric Light Association will be held in Cleveland, February 19th, 20th and 21st. The headquarters will be located in the Hollenden Hotel. The special vestibuled train for Cleveland will leave the Grand Central Depot, New York, next Monday, at 9:30 a. m. The official programme of the convention is as follows:

TUESDAY, FEBRUARY 19, 1895.

Meeting of the Executive Committee—9 a. m., Parlor 138, Hollenden Hotel.

Morning Convention Session—10.30 o'clock, Army and Navy Hall.

Address of Welcome—By Mayor of Cleveland.

President Francisco's Address.

Paper by N. W. Perry—"The Storage of Energy Essential to Central Station Economy; How it may be Accomplished and the Economies Resulting." Discussion—John W. Langley, W. M. Stine, M. J. Perry.

Report of Committee on Relations Between Manufacturing and Central Station Companies—Frederic Nicholls, chairman.

Afternoon Session—2 o'clock.

Paper by E. J. Houston and A. E Kennelly—"A New Method of Measuring Illumination." Discussion—W. A. Anthony, C. D. Haskins, W. S. Howell, Edward Weston, L. Stieringer.

Report of Committee on Data—H. M. Swetland, chairman. Discussion—W. R. Gardener, E. L Powers, H. W. Sexton.

Paper by Walter E. Harrington—"Correct Method of Protecting Electric Circuits."

Questions and Answers—"What Is It You Wish to Know?"

Executive Session.

WEDNESDAY, FEBRUARY 20.

Morning Session—10 o'clock.

Paper by Edward Weston—"Some Economies in Electric Light and Power Stations."

Paper by C. N. Black—"Large Arc Dynamos." Discussion—S. M. Hamill, J. J. Wood, F. W. Rollins, E. R. Weeks.

Topic—"How to Light Large Cities" Discussion—Frederic Nicholls, Geo. A. Redman, Jas. I. Ayer, E. F. Peck, C. R. Huntley, Robert Lindsay, F. H. Clark, T. C. Smith, J. F. Morrison.

Report of Committee on Finance—John A. Seely, chairman.

Questions and Answers—"What Is It You Wish to Know?"

Executive Session.

Afternoon Session—2.30 o'clock.

Paper by E. A. Leslie—"The Operation of High Tension Currents Underground from a Physical and Financial Standpoint." Discussion—H. J. Smith, W. H. Browne, C. H. Wilmerding, John A. Seely, C L. Edgar.

Paper by L. B. Marks—"Arc Carbons and the Rating of Arc Lamps."

Topic—"Incandescent Lighting *vs.* Other Methods." Discussion—H. T. Edgar, E. F. Phillips, W. S. Barstow, E. A. Armstrong, J. Gwynne, B. P. Holmes

Questions and Answers—"What Is It You Wish to Know?"

Executive Session.

Evening Session—8 o'clock.

Topic by a J. Wurts—"Practical Demonstrations of Protecting Lines from Lightning."

THURSDAY, FEBRUARY 21.

Morning Session—10 o'clock.

Paper by Dr. Louis Bell—"The Monocyclic System." Discussion—A. E. Kennelly, L. B. Stillwell, J. F. Kelly.

Report of Committee on Rules for Safe Wiring—Wm. J. Hammer, chairman.

Topic—"Underwriters' Rules vs. National Electric Light Association Rules." Discussion—Wm. Brophy, C. J. H. Woodbury, J. J. Burleigh, A. W. Field,

Afternoon Session—2.30 o'clock.

Executive Session.

Report of Secretary and Treasurer,

Executive Committee.

Election of Officers,

BROOKLYN STREET RAILWAY STRIKE.

According to the leaders of the Knights of Labor the Brooklyn street railway strike has not been declared off, but the collapse of the fight against the companies would be no more complete if a formal surrender had been announced. The men have voted to continue the struggle, but they did so with the tacit understanding apparently, that they should go back to work individually. The developments of the last week have been few in number and, with the exception of those of a legal significance, have been without interest. The wire-cutting seems to have stopped almost wholly, and the number of assaults on the new employees have been comparatively few. The companies have resumed satisfactory service on all their lines, and while the cars are not managed as well by the new men as by the old hands, there is little fault to be found.

The last effort to secure a reinstatement of the old men met with failure on Thursday. To their praise, be it said, the companies would consider no overtures that involved the discharge of the new men who have risked so much to gain honest means of livelihood. President Lewis, of the Brooklyn Heights Company, posted up notices in the car house notifing the men that: "The company assures present employees that they will be retained in their present places so long as they perform their duties faithfully to the company and obey its rules and regulations. Former employees returning to the service of the company must take such places as we can give them, first providing for the new men who are now in our employ."

The complaints of the way in which the law was enforced in Brooklyn during the strike was not confined to charges against policemen. Many persons who believed in law and order represented to Mayor Schieren that several of the justices had failed to do their duty by dealing too leniently with those brought before them charged with assaulting the new motormen and conductors and engaging in various forms of rioting. Mayor Schieren looked into the charges and on Tuesday last made an application to the General Term of the Supreme Court for the removal of Police Justice Watson. The answer to the charge is returnable next week.

PERMISSION TO INSTITUTE AN ACTION DENIED.

The strikers have been uniformly unsuccessful in all legal proceedings which have been thus far instituted against the Brooklyn street railways. On Thursday last Attorney-General Hancock denied the application made by John Giblin, of the Executive Committee, which has been managing the strike, for leave to bring an action to vacate the charter of the Brooklyn Heights Railroad Company. A synopsis of the decision follows:

The attorney-general is requested to apply to the court for leave to bring an action to vacate the charter of the Brooklyn Heights Railroad Company under the provisions of section 1798 of the code of civil procedure. The grounds upon which it is insisted that this action should be commenced are certain alleged offences and violations of the law committed in the month of January, 1895, and I am requested on account thereof to take steps to annul the existence of the corporation, and to have a receiver appointed, who shall sell the assets of the company and divide the proceeds thereof according to law. The counsel who made the leading argument before me in requesting the action to be brought, and who has since that time submitted his written brief, has stated that he does not make this application in behalf of the late employees of the company, but that he appears in behalf of the general public.

It would indeed be difficult to demonstrate how the action which I am requested to bring would be of any benefit to the men who have been thrown out of employment, and who, in common with many others, have suffered in consequence of the unfortunate conditions which have recently called public attention to the city of Brooklyn. Actions of the kind demanded in this application as a general rule result in serious pecuniary loss to persons of limited means and small savings who have been induced to invest their earnings in the stock of corporations, and accomplish a corresponding gain and advantage to wealthy syndicates and individuals who are frequently enabled to purchase the assets of defunct corporations at much less than their actual value. The sale of railroads by receivers, to the ruin of men in moderate circumstances and the further enrichment of those who already have an abundance, has been a matter of not infrequent occurrence, and is a familiar page in the history of the railroads of this and other States. The question then presents itself whether such facts exist as require action to be brought for the forfeiture of the franchise of this particular corporation. As a basis of any such action the attorney-general is called upon to present a petition to the court stating the grounds and the particular acts which in his judgment constitute legal reasons for vacating the charter and annulling the corporate existence of the Brooklyn Heights Railroad Company.

As has been recently held in the matter of the Central Stamping Company (63 N. Y. St. Rep., 282): "Before authority should be given to bring an action to vacate the charter or to annul the existence of a corporation, the attorney-general should point out in his application to the court the particular acts done or omitted which, in his judgment, are sufficient to justify the bringing of such an action, and should allege in his petition wherein the corporation has violated the laws of the State, what it has done or omitted, which allegations should be supported by sufficient evidence to render it probable that a cause of action exists. The fact that such an action has been begun is usually destructive of the credit and business of the corporation assailed, and authority to commence such an action should not be lightly given."

I have examined with care the charges preferred in this particular case for the purpose of determining whether the facts presented constitute a cause of action or would justify the bringing of a suit to forfeit the corporate franchise. It is important to distinguish between violations of the law committed by individuals who are officers of a corporation and illegal acts chargeable to a corporation itself. It was claimed upon the hearing that the officers of the corporation have required its employees to labor more than 10 hours per day in violation of the provisions of the statute regulating the hours of labor in street-surface and elevated railroads chartered by the State in cities of 100,000 inhabitants and over. The provisions of the statute are clear and explicit in every particular. Chapter 529 of the laws of 1887 limits the hours of labor of railroad employees in cities of more than 100,000 inhabitants in the operation of street-surface and elevated railroads to 10 hours to be performed within 12 consecutive hours, with a reasonable time for meals, and makes it a misdemeanor for any officer or agent of any such corporation to exact more than 10 hours' labor in violation of this chapter.

These provisions of the statute are wise and salutary, and were undoubtedly enacted for the benefit not only of the employees of railroad corporations, but also for the purpose of protecting the traveling public, for there is fair ground for argument that excessive labor exacted from railroad employees engaged in the performance of their important and laborious duties renders them less capable of discharging the tasks imposed upon them with the care which is necessary for the protection of the public, especially in the crowded streets of a large city, and the officer of a corporation who violates these provisions of law is guilty of committing an offence injurious to the public, the employee, and the corporation itself, for which he is liable to be punished by both fine and imprisonment, and the public interests, in my judgment, require a proper enforcement of this statute. But such a condition of affairs constitutes no ground whatever for bringing an action to annul the franchise of the corporation. The law prescribes the penalty against the officer and not against the corporation.

Another ground of forfeiture suggested upon the argument was that the company's cars have been running at too high a rate of speed, and I assume greater than that prescribed by the ordinances of the city of Brooklyn. These ordinances are common to every city in the State, and prescribe a penalty for their violation, and much that has been said with reference to a violation of the 10-hour law would be applicable to a failure to observe an ordinance of a city regulating the rate of speed of street surface railways. The particular provisions of the ordinances of the city of Brooklyn have not been called to my attention, but I presume that they are similar to those existing in other cities which provide a penalty by fine or imprisonment, or both, against the officers and agents of the corporation. It is within the power of the officials of the city to protect the public by enforcing the laws and city ordinances, but is not within the power of the attorney-general, in the absence of some provision of law establishing such a ground of forfeiture, to maintain an action to annul the charter of a corporation for running its cars at what they may consider too great a rate of speed.

It has not been claimed upon the argument that the mere non-use or failure to operate the cars of the defendant during the recent disturbance is a ground for forfeiture of its franchise; but it is urged that the officers of the corporation, by violating the provisions of the statute and exacting more than 10 hours' labor from its employees, resulting in the loss of the services of experienced men, and their places being filled by men less competent and experienced, has made itself susceptible to the charge of wilful non-user. It was held by the court in the case before referred to, in the 125 N. Y., that mere non-user for less period than one year is not sufficient ground for the forfeiture of a corporate franchise. As the statute prescribes the penalty against the officers who have violated the provisions of the 10-hour law and limited the punishment to the officers and not to the corporation, in my judgment, it cannot be held that the corporation can be punished for any non-user resulting from the violation of the law upon the part of the officers. It seems to me that it would be unreasonable to hold that while the corporation cannot be punished for the violation of the statute itself, it can be punished for the consequences of such a violation.

A further ground urged for forfeiture of the franchise of the corporation is that it employed non-residents of the State in operating its cars after the company had been deprived of the services of its regular employees, and my attention has been called to the provision of section 42 of the general railroad law, which reads as follows: "Any railroad corporation may employ any inhabitant of the State of the age of 21 years, not addicted to the use of intoxicating liquors, as a car-driver or conductor or in any other capacity, if fit and competent therefor." It is claimed that the legislature meant in reality to say in using the language above quoted that the railroad company "must employ only inhabitants of the State." It appears to me that the language will not permit of such an interpretation. This statute has been substantially in effect ever since 1865, and we believe that this is the first time that it has ever been claimed to mean that a railroad corporation shall be limited to the employment of inhabitants of the State of New York. A history of the law itself indicates very clearly its true intent and meaning. Section 1, chapter 246, of the laws of 1865, reads as follows: "It shall be lawful for the owner or owners of any railroad in this State to employ any inhabitant of this State of the age of 21 years as car-driver or conductor or in any other capacity, notwithstanding any law, regulation, or ordinance of any officer or municipality, or of the common council or government of any city or county to the contrary."

No such provision was contained in the General Railroad Act of 1850, and it was evidently intended to prevent cities from passing ordinances prohibiting street railroads from employing persons who did not reside in the particular municipality where the street-car line was operated. The law is neither mandatory nor prohibitory in its terms. While it appears from the statements made to me by the applicants from the hearing that the laws of the State and the city ordinances may have been violated by individuals, I am satisfied from a consideration of the facts presented by the petitioners that they are not sufficient to justify the bringing of an action to annul the charter of the corporation.

NO ACTION TO REMOVE OFFICERS.

The attorney-general also denied the application to him to begin action to remove Benjamin Norton as president of the Atlantic Avenue Railroad Company and Daniel F. Lewis as president of the Brooklyn Heights Railroad Company. He says:

Applications are made to have actions commenced against the presidents of the Atlantic Avenue Railroad Company and of the Brooklyn Heights Railroad Company, to remove each of said officers from their positions as presidents of the respective companies with which they are connected. The applications are under the provisions of section 1781 of the code of civil procedure, which reads in part as follows: "An action may be maintained against one or more trustees, directors, managers or other officers of a corporation, directing a judgment for the following purposes, or so much thereof as the case requires: . . . (4.) Removing a defendant from his office upon proof or conviction of misconduct and directing a new election to be held by the body or board duly authorized to hold the same, in order to supply the vacancy caused by the removal."

These applications are made on the theory that the presidents of these corporations have violated the provisions of chapter 529 of the laws of 1887, which limits the hours of labor per day to be performed by employees in the operation of street surface and elevated railroads owned or operated by corporations incorporated under the laws of this State, whose main lines of travel or whose routes lie principally within the corporate limits of cities of more than 100,000 inhabitants. This chapter makes it a criminal offence for any officer or agent of such corporation to exact from any of its employees more than 10 hours' labor, the same to be performed during 12 consecutive hours, with not less than one-half hour for dinner, constituting a day. Although this is not a part of the general railroad law, the statute is apparently intended to especially control the conduct of officers having in charge the operation of street surface and elevated railroads in our larger cities. The public interests require that the statute be obeyed, and a disregard of its provisions by the president of a railroad corporation is not only a criminal offence, but must result in injury both to the public and the corporation.

The papers before me allege in general terms a violation of the law, but the allegations must be proven by legal evidence, which, so far as the presidents are concerned, has not yet been presented to me. If, however, it shall appear from the investigations now or hereafter to be made that it can be established by competent proof that the presidents of the companies have broken the law by exacting excessive hours of labor from their employees, the cases will receive further consideration.

NEW PUBLICATIONS.

CATALOGUE OF THE EXHIBIT OF THE PENNSYLVANIA RAILROAD COMPANY AT THE COLUMBIAN EXPOSITION.

The catalogue which has recently been issued by the Pennsylvania Railroad Company will be prized as a valuable souvenir by those who had the good fortune to study the magnificent exhibit made by the company at the World's Fair. The volume is a substantial one and is elaborately illustrated by engravings of most of the objects of interest which were exhibited in the company's handsome buildings on the space just outside of it and in the Transportation Department. The catalogue affords one an excellent idea of the development of means of transportation from those of the most primitive character to the very latest methods, as exemplified in the wonderful equipment of the Pennsylvania Railroad Company.

STREET RAILWAY INVESTMENTS. By Edward E. Higgins, published by the Street Railway Publishing Company, New York.

The value of such a volume as this is daily becoming more evident. As the author states in his introductory chapter, it is probable that "not less than $125,000,000 in cash and in financial and commercial credits have been brought into this field since 1888," and the most casual observer must have noted the growing interest taken in street railway properties in financial circles. Electric railways are now to be found everywhere. The little town in the West is no sooner settled than the street railway promoter makes his appearance. Projects for roads in places small and great are constantly urged on the attention of those who have funds for investment. Where can they find any data to aid them in reaching intelligent conclusions and to enable them to exercise some sort of judgment in considering the tempting arguments and figures presented by interested persons? If they start out on an independent search for information they will discover little, and that little will not be found reliable. Only those who have tried to secure figures from operating companies can appreciate the little cordiality of response extended as a rule to seekers after facts. In this volume Mr. Higgins has compressed a great deal of information which will prove of immense value to those searching for some sort of a guide to the study of street railway values. The book is divided into chapters, each dealing with roads located in a city of a certain size, and elements that tend to make each representative line a desirable property or the reverse for the investment of funds are briefly considered. With this book in his reference library the investor's liability to mistakes in dealing with street railway securities is greatly reduced.

STREET RAILWAYS IN CANADA.

The following statistics relating to street railways in Canada have been prepared:

In September, 1891, the total number of miles of street railways in Canada was 203. Of these 164 miles were operated by horses and 39 miles by electricity. The total number of cars in Canada was 624, of which 562 were run by horses and 62 by electricity. The total number of roads in Canada was 21, of which 14 were run by animal power and 7 by electricity. The total number of horses was 3,076, motor cars 43, and trailers 18. Comparing the above statistics with those of November, 1894, we find that the total street railway mileage of Canada has increased from 203 to 372 miles, or 169 miles. The electrical mileage has increased from 39 to 343 miles. The mileage operated by horses has decreased from 164 to 31 miles. The total number of cars has increased from 630 to 1,006. The number of electric motor cars has increased from 44 to 505. The number of horse cars now in operation is 178. The total number of lines in Canada has increased from 21 to 28. In the principal cities of the Dominion the trolley system has superseded animal power, while seven new roads have been constructed, electricity being adopted in every instance. There are now only 150 horses used in Canada for street railway work.

FINANCIAL NOTES.

Long Island Road Leased.—The Long Island City & Newtown Electric Railroad has been leased to the Steinway Railway Company. The road is owned by Ex-Mayor Patrick J. Gleason, and is considered a valuable property, as it controls many franchises to points outside of the city.

Brooklyn Heights Election.—At a meeting of the directors of the Brooklyn Heights Railroad Company and of the Long Island Traction Company last week, the following officers were elected: Daniel F. Lewis, president; John G. Jenkins, vice-president, in place of E. W. Bliss, and W. A. H. Bogardus, secretary and treasurer of both companies.

Electric Cars to Stay.—Having stood the test of the worst snowstorm in many years electric traction may be accepted as having come to stay, and it only remains to secure and apply the best safeguards against accidents by collision with other vehicles and pedestrians to render it the ideal method of cheap transit for city residents.—*Philadelphia Times.*

Indianopolis Citizens Company's Earnings.—The gross and net earnings of the Citizens' Street Railway Company, of Indianapolis, for the last eight months of 1894 show increases compared with the corresponding period in 1893. The net returns were $189,853 in 1893, and $293,367 in 1894, an increase of about $102,000. This increase resulted from a reduction in operating expenses, as the increase in gross earnings was only from $576,579 in 1893 to $612,681, or about $36,000.

To Purchase Open Cars.—Part of the $1,000,000 which the assessment just called on the stock of the People's Traction Co., of Philadelphia, will put into its treasury will be expended in the purchase of summer cars. The company started out with the intention of having a full summer and winter equipment of cars. Though a large number of summer cars were received last year before cool weather set in, the company has not a sufficient number for summer use.

Forfeiture of Franchise Demanded.—City Attorney Chapman has filed a bill in the Circuit Court in Owosso, Mich., which has resulted in giving the Owosso & Corunna Street Railway Company 20 days in which to make answer why it should not forfeit its franchise for failing to comply with the terms of its contract with the city of Owosso. Receiver Waters made no effort to start his cars during the three days allowed him by the City Council. The line has not been operated for the past nine weeks.

Missouri Corporation Law.—An enabling act has been introduced into the Missouri Legislature looking to the consolidation of all the street-car lines in St. Louis, under a system similar to that of Philadelphia. Under the present law no corporation in the State may be capitalized for more than $10,000,000, and this has prevented the roads from amalgamating long ago. They make no secret of the fact that they are anxious to consolidate. The measure introduced provides that corporations may issue a share capital of $50,000,000, which will be ample for the purpose intended.

Geneva (N. Y.) Electric Railway.—The following figures are taken from the financial statements of the Geneva (N. Y.) Electric Railroad Company. The Geneva road is four miles in length, and three cars are operated regularly under a 20 minutes' headway. The gross receipts for the six months were $8,218, and the operating expenses $5,839, leaving net receipts of $2,379. After deducting the interest on bonds for the same period, amounting to $1,200, there remains a surplus of $1,179. The average number of passengers carried during each month was 30,000. The extension of the road to Waterloo will make the line 10 miles long and largely increase its earnings without adding greatly to its operating expenses.

New Jersey Consolidation.—The James A. Morrisse system of electric railway lines running between Singac, Paterson, Passaic, Rutherford, Hoboken and Jersey City has been absorbed by the New Jersey Electric Railway Company. Six individual companies are consolidated, and the officers of the new company are: President, Charles A. Johnson; Vice-President, Thomas D. Jordan; Second Vice-President and Treasurer, James A. Morrisse; Secretary, John J. Scanlan. Among the principal stockholders are Henry P Hyde, Gen. Louis Fitzgerald and Col. F. K. Hain of New York. The new company has filed a mortgage of $3,500,000 with the clerks of Passaic, Bergen and Hudson counties. It was executed by Charles A. Johnson and John J. Scanlan to the Mercantile Trust Company of New York, as trustee for the bondholders. The bonds of the company bear five per cent. interest, payable in 50 years. A large power house, with a 3,000 H. P. engine, is being built at Secaucus. It is stated that through lines to Jersey City will be in operation about April 1. The line runs almost parallel to the Erie Railroad, and is now complete and in operation from Singac, Passaic County, to Rutherford. The cars are of the vestibule pattern.

The Findings of a New Jersey Judge.—Lawyers have been discussing with considerable interest the statements made by Judge Garrison of the Supreme Court, in the Supreme Court at Woodbury, N. J., in the case of the administrator of Charles C. Purton, deceased, against the Camden, Gloucester & Woodbury Electric Railway Company. The suit was brought to recover for the death of Purton. The contention of the judge was that the trolley company had no more right on a public thoroughfare than any vehicle, except that they were compelled to operate their cars within a specified location, while teamsters had the use of all portions of the road. He further contended that there was a broad distinction between steam roads and trolley roads, because the former owned the land on which their road was built, while trolley companies were granted franchises for which they are not compelled to pay anything. He further said that the trolley company had no more authority to run down teams, because the drivers of such refused to leave the tracks, than had the driver of any other vehicle, as trolley franchises did not give the company rights or privileges not enjoyed by owners of teams.

West Chicago Bonds.—The West Chicago Street Railroad Company will, within a short time, issue $1,000,000 additional 6 per cent. debenture bonds. This issue will raise the total amount of the debentures outstanding to $3,000,000. It is said some of the stockholders feel that the company might better have issued stock than bonds, but it is explained that $1,000,000 West Chicago stock could not be sold at or above par in the present depressed condition of investment and speculation, while the bonds will sell readily around par. The West Chicago Company has also guaranteed $850,000 bonds of the Chicago Electric Transit Company, principal and interest. The North Chicago Company guarantees $150,000 of the same issue of bonds. It is possible, of course, that West Chicago will guarantee other issues of bonds to be put out by connecting electric street railroad companies, but the total guarantee will for the present be confined to $1,000,000. The lines which the West Chicago Company will aid in this way are all feeders of that company and promise to be a source of revenue in the future. At present Mr. Yerkes thought it would not be necessary for West Chicago to guarantee more than $1,000,000 bonds of connecting lines.

NEW INCORPORATIONS.

Chicago, Ill.—The Chicago Belt Line Street Railroad Company has been incorporated. The capital stock is $500,000, and the promoters are: Flavius J. Phillips, C. Henry Loehr, Andrew Matson.

St. Louis, Mo.—The St. Louis Belt Railway Company has been incorporated with a capital stock of $2,000. The promoters are: Chas. Green, L. M. Rumsey, Moses Rumsey, all of St. Louis, Mo.

Florence, Colo.—The Florence Belt Line Railway Company has been incorporated with a capital stock of $25,000, by E. M. Weil, S. Siess, Leon Siess, C. L. Huff, all of Florence, Colo.; James B. Crandall, Denver, Colo.

Scranton, Pa.—The Scoville Island Street Railway Company has been incorporated with a capital stock of $36,000. The promoters are: Wm. S. Tompkins, Pittston, Pa.; Elisha A. Coray, Jr., West Pittston, Pa.; Howard M. Streeter, Scranton, Pa.

Little Falls, N. Y.—The Little Falls and Herkimer Street Railway Company has been incorporated with a capital stock of $80,000. The promoters are: Clinton Beckwith, Herkimer, N. Y.; J. V. Quackenbush, Mohawk, N. Y.; N. J. Davis, Utica, N. Y.

New Rochelle, N. Y.—The New York, Westchester & Connecticut Traction Company, capital $600,000, has been incorporated with the Secretary of State. The company will operate a street surface railroad 16 miles in length. The principal office will be in the village of New Rochelle. The termini of the road are the intersection of the Boston Post Road and the Bronx River in Westchester County and the intersection of the Boston Post Road and the Byram River in Westchester County at the eastern State line of this State. The directors are Martin J. Keogh, of New Rochelle; Bernard Kates, of Paterson, N. J.; Philip Kates, of Paterson, N. J.; John Foley, Jr., of Sewaren, N. J.; John F. Conch, Edward Hassett, John A. Bensel, Daniel F. Copalan and Franklin A. Wilcox, of New York City. This company is supposed to be an extension of the People's Traction Company of New York City, recently incorporated here.

NEWS OF THE WEEK.

Lansing, Mich.—A bill compelling street railway corporations to vestibule their cars has been introduced in the legislature.

Knoxville, Tenn.—Several motormen and conductors on the East End Railway struck a few days ago because of a dispute about time. The places were filled without difficulty.

Gloucester, Mass.—The Worcester Construction Company has contracted to build the electric street railway from Gloucester to Beverly. The line will be 18 miles long. Work will be begun early in the spring.

Washington, D. C.—The House Committee on the Judiciary recently discussed the bill incorporating the National Rapid Transit Railway, proposing to run a high-speed electric railway between New York and Washington and voted against it.

Indianapolis, Ind.—The County Commissioners have agreed to give a right of way along the west side of the Madison road for the construction of an electric line by the Indianapolis, Greenwood & Franklin Company, for a period of 50 years.

Media, Pa.—An ordinance has passed first reading in the council requiring all trolley cars to come to a full stop at each street intersection before crossing the street. For a violation of the ordinance a penalty of $25 for each offence is to be imposed.

Boston, Mass.—A bill was presented in the House by Mr. Meyers, of Cambridge, providing that no railway shall hereafter be constructed across the tracks of any railroad at grade without the consent of the Railroad Commissioners, nor shall any railroad hereafter be constructed across the tracks of any street railway without such consent.

Chicago, Ill.—A verdict has been returned in Judge Gibbons' court in the condemnation suit of the Metropolitan West Side Elevated Railroad Company against a number of property-owners along the line of the northwest branch of the road in the neighborhood of Humboldt Park. The jury gave the property-owners $15,856.87 for the property taken.

White Plains, N. Y.—The Board of Trustees has granted a franchise to the New York, Elmsford and White Plains Railroad Company to construct and operate an electric railroad through Railroad avenue, Central avenue, Broadway and Lake street. The company must deposit $2,500 in the White Plains Bank, to be forfeited to the village if the road is not completed by Aug. 1.

Bridgeport, Conn.—Col. N. H. Heft, president of the Bridgeport Traction Company, will supervise the electrical equipment of the Nantasket Beach branch of the New York, New Haven & Hartford road. President Clark and Colonel Heft have decided on the location of the power station at Nantasket. It is expected that Colonel Heft will resign the presidency of the traction company.

Reading, Pa.—The Highway Committee has decided to recommend favorably the ordinance granting the Birdsboro Street Railway Company privileges in Reading, with an amendment requiring the company to pave one-half of all the streets occupied with improved material. This railway is to form one of the connecting links of the series of roads through the Schuylkill Valley, to run from Philadelphia to Reading.

Detroit, Mich.—The Detroit Railway Company has awarded to the Cambria Iron Company, of Johnstown, Pa., the contract for rails, bolts and fish plates for about 45 miles of track. The price agreed upon is $170,000. The contract for all special work has been given to the Cleveland Frog and Crossing Company, the price being $48,600. Both contracts stipulate that deliveries shall begin in April, and shall continue as rapidly as materials are required.

Waukesha, Wis.—The plans for the power house of the Waukesha Beach Railway have been decided upon. It will be a structure 40 × 60 feet. Work will commence as soon as the weather will permit. Poles for the overhead wires are now being distribted along the route. The plans for Waukesha Beach Park at Pewaukee Lake have been made which indicate that the improvements will be very complete and attractive. Work upon these will begin early in the spring.

Lancaster, Pa.—As residents of Strasburg Borough are anxious to be connected with the electric railway system of Lancaster County they have already secured the right of way for a line of the Pennsylvania Traction Company through 21 of the 29 properties between Lancaster and Strasburg, through which the road must pass. Many citizens have already agreed to take bonds, and as the streets of the borough are too narrow to contain the electric road and driveways, too, the Borough Council has been called to authorize the laying out of a new street. There is no doubt but that the line will be built early in the spring.

New York, N. Y.—The Metropolitan Street Railway Company has renewed its application before the Board of Aldermen for a franchise to construct its lines to the city limits, and has filed with the Secretary of State a certificate of extension of its lines. The company applied to the Board of Aldermen last year for practically the same franchise that it now asks for, and the Third Avenue Company asked for a franchise over the same route. The old Board of Aldermen went out of office with the matter unsettled. The Third Avenue Company re-applied for the franchise some time ago, and now a fight is expected between the two lines before the Board.

Chicago, Ill.—Mayor Hopkins vetoed the North Side and West Side trolley ordinances, which the Council passed recently. The mayor took exceptions, in a long message, to many features of the ordinances as passed, maintaining that sufficient protection as to location and character of poles was not provided, that no provision was made for the supervision of construction; that no cash deposit was required as a penalty in case of not relaying disturbed streets; that no indemnity in case of damage to the city was enjoined; that such ambiguity existed in wording the ordinances that electric lines might be substituted for cable lines; that no compensation to the city whatever was exacted for the franchises and privileges granted. On this last point the mayor's message laid great stress, maintaining that the street railway company should pay the city, or recompense it for the franchises, naming $5,000, and holding that sum was only suggested that the Council might take proper action in the premises. Two ordinances embodying the mayor's suggestions were adopted.

Weymouth, Mass.—The Board of Selectmen has granted a location to the Braintree & Weymouth Street Railway Company. The citizens of Weymouth Landing and South Weymouth are jubilant over the decision of the Board. There is a provision that the Braintree & Weymouth Company allow the cars of the Quincy and Boston Company to run over its tracks from Commercial square to the Hingham line. The Quincy & Boston Company was granted a location by a unanimous vote from its present location in Jacksou square. East Weymouth, through Commercial and Station streets to the station of the New York, New Haven & Hartford Railroad station, provided it allow the cars of the Braintree & Weymouth Company coming through Pleasant street to run over its tracks to the railroad station, the road to be completed by June 15, 1895. The Braintree & Weymouth Company must have one section of its road in operation by Dec. 1, 1895, and the other in June, 1896. It is highly probable that the Braintree & Weymouth Company will have its whole line in operation by July 1, 1895.

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PERSONAL.

Mr. Eugene L. Maxwell, of Manning, Maxwell & Moore, of New York, died at his home in Brooklyn last Saturday.

TRADE NOTES.

The Berlin Iron Bridge Company, of East Berlin, Conn., has finished the new gas house for the Bay State Gas Company at Boston. The building is 51 feet wide and 146 feet long, and has iron floor, iron roof trusses and iron purlins covered with slate. The same company has lately completed for the Aqueduct Commissioners, of New York City, two iron bridges, one at reservoir M, the other at reservoir D.

The Central Electric Company, of Chicago, has just issued a new catalogue of its railway material. It is a handsome publication and it is profusely illustrated. The company says in the introduction: "It has been our effort in compiling this catalogue of railway material to eliminate every article not bearing the impress of the most practical and advanced thought. We are glad to recognize the fact that buyers are daily becoming more severely critical, insisting upon the best that can be made. We have endeavored to co-operate with this tendency to the fullest extent, and believe that a careful perusal of these pages will illustrate the position we have assumed, and which we purpose to maintain in the railway field."

Standard Underground Cable Company.—The Standard Underground Cable Company, of Pittsburgh, has just closed a contract with Mr. J. R. Wiley to represent it it in the West, with headquarters in the Rookery Building, Chicago. Mr. Wiley is well known in electrical circles, as he has been connected with electrical enterprises for many years. For eight years he was superintendent of private lines for the Metropolitan Telephone and Telegraph Company of New York. He is a brother of Mr. Geo. L. Wiley, who has represented the Standard Underground Cable Company in New York and the East for the last 10 years. Mr. J. R. Wiley assumes the management of the Western sales department, made vacant by the death of Mr. Fred, E. Degenhardt. Mr. Wiley is a Western man, and his family are Chicagoans.

RECORD OF STREET RAILWAY PATENTS.

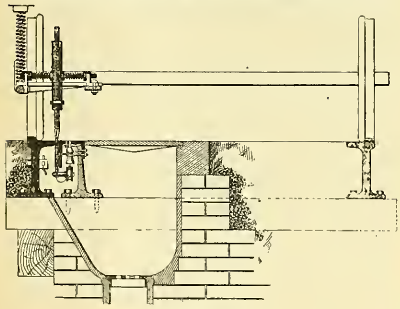
U. S. Patents Issued Feb. 5, 1895.

533,425. Automatic Car Fender; Henry P. Barney, Washington, D. C., Assignor to the Carr & Barney Manufacturing Company, of Virginia. Filed Nov. 9, 1894. The fender comprises a series of fingers independently journaled upon the same shaft, and a movable cushioned back-stop supporting the fingers independent of the latter, and of the finger shaft.

533,447. Electric Railway; John G. Douty, Williamsport, Pa., Assignor of two-thirds to James N. Kline and William G. Elliot, same place. Filed May 17, 1894. A tubular arm is pivotally connected to the car and a trolley arm carrying a trolley wheel passes through the arm in such manner as to be capable of movement axially and longitudinally therein. (See illustration).

533,497. Safety Apparatus for Street Railway Cars; Oswald R. Routh, Jersey City, N. J. Filed May 19, 1894. Stirrups, have sockets, and books, open at their inner sides, the frame is loaded at its inner part and has the fender, at its foward end. There is a lifting chain, and means for actuating it to lift the frame to bring the fender into position for renewed use and operation.

533,528. Safety Attachment for Street Cars; Carl E. R. Christensen, Brooklyn, N. Y. Filed Dec. 23, 1893. There are upright on the platforms, one at each end of the dashboard, and the clips are mounted adjustably on the uprights. An attachment having its siderails extending above the level of the platform is hinged to the respective clips whereby the attachment may be conveniently adjusted up or down. Slotted brackets are secured to the car, and spring-rods are hinged to the attachment and extend through the brackets, and the springs on the rods.



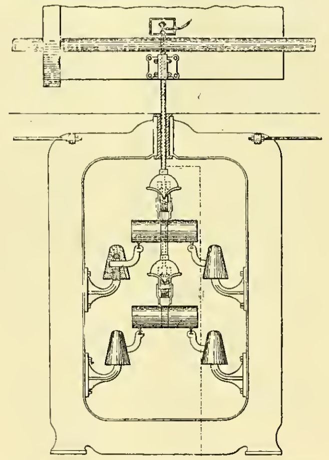
No. 533,447.

533,562. Cable Railway; Minott W. Sewall, New York, N. Y. Filed Jan. 18, 1893; There are two cables with supporting sheaves therefor, and the pair of curve-sheaves arranged parallel one to the other with vertical axes. A movable guide is interposed between the carrying sheaves and the curve-sheaves.

533,565. Car Fender; Friedrich Sprick, West Hoboken, N. J. Filed Sept. 10, 1894. There is a frame underneath the platform, comprising therein side bars, and a crosspiece having rollers thereon. The fender frame is weighted at one end and balanced on rollers and movable longitudinally. A spring-actuated rod is connected with the weighted end of the fender, and a sliding bearing for said rod, consisting, essentially, of a sliding bearing block and a perforated pivot block.

533,598. Running Gear for Electric Cars; Charles A. Jackson, Reading, Mass. Filed Sept. 15, 1893. This is the combination of the clutch-block having slots, the internal ring, the gear-wheel connected with the ring by bolts extending through the slots in the block and means for actuating the gear.

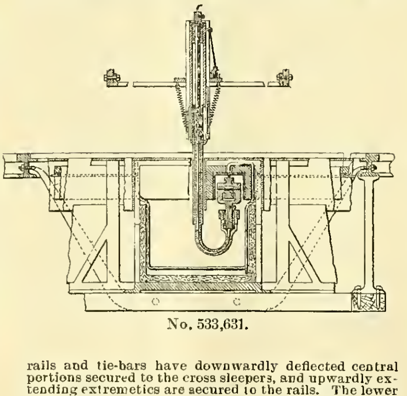
533,610. Conduit Electric Railway; Alfred Rozenholz, San Francisco, Cal., Assignor of one-half to Samuel J. Clarke and Harvey S. Brown, same place. Filed May 22, 1894. The conduit or tube is slotted upon the top and arms extend from the car down into the slot and have a conducting wire or wires extending between them and movable with the car. The main conducting wires extend along the side of the track and branches extend from the main conductors into the conduit. A switch mechanism consists of the laterally extending hinged tilting insulating device having an interior conducting chamber with which the branch wire connects. A pulley is journaled upon the outer end of the tilting device in the path of the conducting wire or wires, and is adapted to be engaged by and to form contact with the conducting wire of the car when the latter passes. A spirally wound magnet within the chamber has its coil connected directly with the pulley and movable armatures in said chamber whereby connection is made between the conducting chamber and the pulley, when the device is tilted and contact formed with the wires upon the car. (See illustration.)



No. 533,627.

533,627. Conduit Electric Railway; William H. Bsker, Pawtucket, R. I. Filed May 18, 1894. A trolley comprises a roller-equipped carriage for traversing lines of conductors laid at different elevations in the conduit, and conductor plates for extending through the conduit slot and insulated from each other. One of the plates extends downward beyond the other, with suitable connections between the plates and the carriages respectively. An armor incasing the conductor plates has a pendent portion, a water shedding hood fastened to the armor above the upper carriage, and a similar hood fastened to the pendent portion of the armor over the lower carriage. (See illustration.)

533,631. Subway for Electric Railways; Frank E. Button, Rochester, N. Y. Filed June 6, 1894. Serial No. 513,650. The cross-sleepers arranged beneath the rails and tie-bars have downwardly deflected central portions secured to the cross sleepers, and upwardly extending extremetics are secured to the rails. The lower section of a subway is interposed between the rails and mounted on the deflected central portions of the tie bars, and the upper sections of the subway consist of longitudinal divisions having their adjacent sides separated for forming a groove or slot entering the subway. (See illustration.)



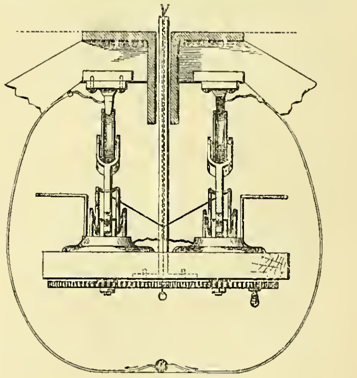
No. 533,631.

538,632. Safety Guard for Cars; Samuel F. Clouser, Brooklyn, N. Y., Assignor of one-half to John S. Collins, same place. Filed May 19, 1894. A plurality of horizontal guard rods or bars is suspended in swinging adjustment from the side of the car, in position to swing in a plane at right angles to the length of the car up out of the way of passengers getting on and off the car or down into position to obstruct the passage of passengers getting on and off.

533,698. Safety Connection for Electric Conductors; Ralph E. Bates, Brooklyn, N. Y., Assignor of one-half to James S. Topham, Washington, D. C. Filed June 20, 1894. This is a hanger for electrical conductors, comprising a housing and two plates. The housing has traverse bolts, and the plates provided at the forward ends with vertical slot or kerfs, adapted to engage the forward bolts. A horizontal slot or kerf in their inner ends, engages the inner bolts of the housing; the forward ends of the plates are connected to the electric conductor.

533,772. Trolley for Underground Conduits; Charles M. Yost, Washington, D. C., Assignor of forty-one eightieths to Gabriel Edwnionston, Lemuel F. Burner and Georgianna T. King, same place. Filed Nov. 3, 1894. This the combination of a pivoted and swiveled trolley-arm, a depressible spring support therefor, and a guide and guard for the arm in its movements, and means for limiting the upward movement of said arm.

533,830. Car Brake; Robert C. Snowden, McKeesport, Pa. Filed March 17, 1894. The brake comprises a wheel-brake shoe, a carrier for the same having both a sliding and an oscillating movement, a rock shaft with abutment arm acting against the brake shoe carrier to move it longitudinally and be in turn deflected by it, means for rocking the shaft initially by hand, and a rail-brake mechanism connected to the rock shaft and arranged to be applied by the last part of the rocking motion of the shaft by the power derived from the wheel-brake.



No. 533,836.

533,836. Conduit System; Charles M. Yost, Washington, D. C., Assignor of forty-one eightieths to Gabriel Edmonston, Lemuel F. Burner, and Georgianna T. King, same place. Filed Nov. 3, 1894. An alternately arranged fixedly-mounted conductor bars have an independent connection with the main conductor and are arranged with their ends overlapping. There is a separate plate for each bar by which it is secured in proper position with relation to the slot. (See illustration.)

533,845. Car Fender; J. H. Faulstich, New York, N. Y., Assignor of five-sixths to George Kraus and Frederick Hausman, same place, and Charles W. Stringham and John A. Williams, Brooklyn, N. Y., and George H. Thompson, East Orange, N. J. Filed March 14, 1894. The fender is constructed in two sections, an upper vertical fixed section adapted to be supported in front of the dashboard, and a lower horizontal sliding section. The sliding section is adapted to pass beneath the car, and there is a locking device for connecting or disconnecting the rear end of the sliding section and the verticle section.

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Railway Employes' Associations.

The practical workings of a mutual benefit society among street railway employes are described by William J. Richardson, Secretary of the American Street Railway Association, in a paper which appears in this issue. One cannot avoid comparing the great benefits derived from such an association with those conferred upon the membership of the average street railway union and the comparison is by no means favorable to the latter organization. Such an admirable association as Mr. Richardson describes ought to be the means of accomplishing a vast amount of good among street railway employes.

Street Railway Police.

A strong argument can be advanced in favor of the petition for the appointment of street railway police, that has recently been submitted to the Massachusetts Legislature. Street railway companies have to carry all comers, and at times objectionable persons enter the cars regardless of the rule that those who are "intoxicated or otherwise violating public decency are not allowed on these cars." This is particularly true at night, and on late trips in certain cities the street car is not fit for a decent person to ride in. Conductors naturally dislike to attempt suppressing any disorder or ejecting objectionable persons, as they fear they may involve themselves in trouble. If police officers, whose sole duty it would be to ride on street cars, could be depended upon for protection at such times, a safeguard would be thrown about street railway travel that is now sadly needed.

The Subway in Boston.

Projects without number have been suggested to relieve the congested area in Boston. The public is clamorous for improvement, and naturally enough, for under existing conditions street railway travel is greatly impeded, and business is seriously interfered with by the concentration of traffic. It has been generally conceded that no plan could have any great value unless it involved the removal of cars from the crowded streets, and provided for them an avenue in which their progress would be unimpeded. For this reason the public has become convinced that the only solution of the problem lay in the construction of a subway. The report of the commission which was appointed to undertake the improvement has just been made public, and a synopsis of it appears elsewhere in this issue. The commission outlines a plan which it believes will overcome the trouble, and it asserts that in the construction of its subway no great engineering difficulties are likely to be encountered.

Bogus Accident Claims.

Brooklyn claim agents who recently brought to light an attempt to secure money from a street railway company by a bogus accident claim, deserve the thanks of transportation companies generally. The game which this precious pair played was ingenious and was well calculated to deceive even the most incredulous representative of a claim department. The plan which they followed was this: The woman in the case simulated paralysis, claiming that it was due to a street railway accident, and so perfect was the deception that even skillful physicians were imposed upon. Beyond all doubt the scheme would have been successful in Brooklyn had it not been for the extraordinary patience and unusual ingenuity of the claim agents and detectives. The swindlers went so far as to bring suit, but before the case was brought into court the couple took alarm and fled the city. It is unfortunate that the case ended in this way. Had the suit come to trial, the paralytic and her husband would undoubtedly have put themselves on record in such a way as would have resulted in their incarceration in a safe place for some years to come. Street railway companies will do well to investigate carefully claims for accidents alleged to be due to paralysis produced in street railway accidents, as the Brooklyn swindlers are not likely to abandon a game that is so likely to meet with success wherever it is tried.

Inquest on the Brooklyn Strike.

The street railway strike in Brooklyn is dead, and a legislative committee is holding an inquest. The evidence that has thus far been given throws little or no light on the causes of the trouble. The most interesting part of the testimony was that given by President Lewis, who, in referring to the damage sustained by the Brooklyn Heights Railroad Company, asserted that 600 out of 900 cars had been more or less damaged, and that the total loss due to the injury of the plant was about $100.000. This, of course, was the result of the activity of the lawless element that broke windows and cut wires, and the loss may be regarded as a partial measure of the violence. In this connection the testimony of labor-leader Connelly seems almost humorous. He solemnly assured the committee that the only lawlessness of which he was cognizant was attributable solely to the militia and the police. Mr. Connelly, therefore, if he were consistent, would ascribe to the pernicious activity of the military and the peace officers the damage to property which Mr. Lewis estimates at about $100,000. This view of the case is about on a par with most of the public utterances of the strike leaders, who, up to the day prior to the official end of the strike, declared that the men had won the fight and that victory was assured. The entire testimony of this man Connelly is so utterly at variance with the well-known facts, that one is constrained to commiserate with the men for falling into the clutches of such an unprincipled leader. He is worse, if anything, than Debs or Howard. The disastrous ending of the strike has had its effect on other street railway employees, who were watching with intense interest the progress of the Brooklyn strike. In our news columns mention is made of the fact that the employees in both New Orleans and Boston have voted against strikes as a means of bettering their condition and have decided to employ other methods to attain their ends, that are less violent than those adopted in Brooklyn. This is encouraging, for it goes to prove that union men can learn lessons from mistakes of this nature, although, unfortunately, they are not apt students. As Connelly himself now admits, the Brooklyn strike was ill-advised and ill-timed, and it is a satisfaction to realize that the fact is recognized.

OVERHEAD WIRES IN PHILADELPHIA.

The report of Chief Walker of the Electrical Bureau of Philadelphia has just been made public. He mentions that the city ducts are occupied to the following extent by the railway companies: Electric Traction, 201,809 ft.; People's Traction, 158,304.44 ft.; Philadelphia Traction, 4,539,053 ft., and Hestonville, Mantua & Fairmount, 214,812 ft.

In reference to the overhead trolley system Mr. Walker says:

"I am still of the opinion that the successful working of the underground trolley is assured, and as rapidly as circumstances will admit all the wires should be depressed.

"The dangerous features of the overhead trolley and electric system were, perhaps, never more forcibly illustrated than during the storm of December 27, 1894. The snow, winds, sleet, etc., incidental to such severe storms, in this instance were aggravated to a high degree, causing wires, poles, etc., that would, perhaps, have withstood many storms of less magnitude to be broken and twisted and fall to the surface of the highways, meeting in their descent a new danger (the trolley wire) never before experienced during a severe storm in this city. The guards placed above the trolley wire to prevent it from contact with other wires falling upon it became in themselves a danger.

"In many instances they broke and coiled around the trolley wires, and falling into the street, made it dangerous for pedestrians. Under ordinary circumstances the 'guard' wires might possibly have prevented others from coming in contract with the trolley wires, but in circumstances of this kind they are utterly useless: in fact, become a danger themselves by breaking and falling to the street.

"Even when they remain in position the foreign wires falling from all directions drop between the guards, and being in contact with the trolley wire carried the current to the guards, which being fastened and ground to the poles presented an additional danger to any one touching the poles.

"Underground wires remain intact, as from their positions they do not feel the effects of a storm. This is but another and more forcible illustration of the necessity of placing electric light, telephone and trolley wires under ground."

INDICTMENT OF BROOKLYN STREET RAILWAY OFFICERS.

President Benjamin Norton and Superintendent Daniel Quinn of the Atlantic Avenue Railroad Company have been indicted by the grand jury of Kings County for alleged violation of the 10-hour law. The bills were found upon evidence furnished by persons who were in the employ of the company before the recent strike. It will be remembered that on the preliminary hearing before a police justice, Mr. Norton and Mr. Quinn waived examination, and the cases were referred to the grand jury. The indictments charge Mr. Norton and Mr. Quinn with requiring more than 10 hours' labor to be performed within 12 consecutive hours by an employee of a corporation. One of the indictments states that Mr. Norton on Jan. 12, 1895, was president of a certain railroad corporation of the city of Brooklyn, which was the owner of a certain street surface railroad, known as the Atlantic Avenue Railroad, whose main line of travel lies principally within the corporate limits of the city, said city being a city of more than 100,000 inhabitants, that Daniel J. Quinn was Superintendent of the railroad and had charge of the conductors and motormen, that Jeremiah Desmond was a conductor in the employ of the corporation under the management of Norton and Quinn, and that they unlawfully required more than 10 hours' labor within 12 consecutive hours. Desmond alleges that he was compelled to work 11 hours and 9 minutes from 6 a. m. to 6 p. m.

The other indictment against the defendants is similar, except that there it is charged that Mr. Norton and Mr. Quinn compelled Conductor James Dwyer to work 11 hours and 26 minutes from 1 p. m. to 1 a. m.

Paw Paw, Mich.—At a railroad meeting last week Detroit capitalists offered to build an electric road from Paw Paw to Lawtou for a bonus of $15,000. A resolution was adopted accepting the proposition.

END OF THE BROOKLYN STREET RAILWAY STRIKE.

The Brooklyn street railway strike has been declared officially ended by the committee which had the fight in charge. This body was fairly driven into taking action to abandon the strike by the importunities of the men, who had grown tired of hearing the leaders confidently predicting victory every hour of the day when the loss of the fight had been apparent for weeks. They began to grow clamorous, and the leaders, fearing that their followers would make a stampede for work regardless of official disapproval, decided to yield to the inevitable and the flag was hauled down. The strike was abandoned by the vote of the board only so far as it related to the Brooklyn Heights and Brooklyn, Queens County and Suburban railway companies. No action was taken in reference to the Atlantic Avenue road, for the simple reason that it had all the employees that it required; the official acknowledgment of defeat would not lead to the re-employment of any of the old men. By refusing in this way to remove from the road the stamp of their approval the leaders hoped to discourage patronage of the road by strike sympathisers. An address was issued to the public, in which the following appeared:

"Our people, after a heroic resistance, have at last submitted to the inevitable. The civil, the military, and in some instances the judicial powers have all been used to coerce them. The companies started out to starve their employees, and they have finally succeeded. It has been a fight of dollars against empty stomachs, and, as was to have been expected, the dollars have won a victory, though a dear one."

No regret was expressed for the lawlessness that had been manifested, but an appeal was made for more money.

INVESTIGATING THE STRIKE.

The Committee of the Legislature appointed to institute an inquiry into the causes of the Brooklyn street railway strike began its labors last week. The first witness called to the stand was Martin J. Connelly, who was the leader of the strikers. His testimony scarcely seemed to coincide with previous statements issuing from the headquarters of the strikers. When asked about the causes of the strike he said it was due to the failure of the companies to obey the 10-hour law, but as a matter of fact the men did not seem to find fault with the practice of the companies in this respect till after the strike was declared; then the alleged violations of law were frequently referred to as a grievance. The companies' alleged action in discharging electrical employees because of their refusal to take the places of motormen and conductors in the event of a strike was assigned as the second cause, but the discharge of the men took place only three or four hours before the strike, and the matter of striking had been under active discussion for 10 days or more before this time.

The refusal of the companies to grant the demand for increased pay was referred to as another cause, but the fact is this claim was waived in the attempts to reach a compromise before the strike was declared. Another cause of the strike, which the witness mentioned almost incidentally, was the refusal of the companies to allow the union to regulate the number of trippers to be engaged, but actually this was the great cause of the trouble. Mr. Connelly stated on his oath that the only acts of violence that he knew of were committed by the police and the militia. He might have learned by looking over the records of the police courts of scores of acts of violence, of assaults and of wire-cutting committed by strikers. Not much faith could be put in the testimony of a witness whose ignorance was as comprehensive as that of Mr. Connelly.

Daniel F. Lewis, President of the Brooklyn Heights Railroad Company, was the next witness. In reference to his companies' practice regarding the 10-hour law, he testified as follows:

"The contract as made in 1887 was that the men were not required to work more than 12 hours a day. In 1889 the 10-hour law was signed by the governor, and the men made an agreement with the company that the employees should work 10 hours, not including stand time or meal time. The reason why the stand time was not reckoned in the men's day's work was that it is impossible to get exactly 10 hours' work in 12 consecutive hours. The legislature probably thought it could be done. The fact is it cannot be done. It has been found that, owing to various lengths of the railroads, many men would, at the expiration of their 10 hours, be left anywhere between the termini of the roads. It would be manifestly impossible to have men take their places and take the cars to their destinations. The men saw this, and agreed to not count the stand time at the swing at each end of the road. The proposition for 1895 made by the men was, as to stand time, identical in effect with the contracts in previous years. When the men talked, however, of counting in the stand time in the day's work, I said it would cause a big dispute in less than a week. It is impossible to put on more trips, for if we did it we would subject ourselves to the charge of exceeding the provisions of the 10-hour law."

Mr. Lewis gave at great length the financial history of the Brooklyn Heights Road and continued in reference to the causes of the strike: "The agreement offered to the men at the first of the year was the same that had been in force since 1889, when the 10-hour law went into effect. It is impossible to arrange the schedules so that exactly ten hours' work would be performed, and the men agreed not to count standing time. The change in motor power offered no ground for asking an increase in wages. No higher class of labor was required. Ninety per cent. of our old drivers were converted into motormen at our expense. In a week we can make a good motorman out of a man of average ability. The number of trips have increased about 15 per cent. The accidents have not increased materially. In 1891, when we used horses exclusively, seven persons were killed. In 1894 10 were killed. The volume of traffic meanwhile increased 25 per cent.

"There was no complaint by the men that they were compelled to violate the 10-hour law. That our interpretation of the law was satisfactory to them is attested by the fact that they signed the agreement year after year. We could not include in 10 hours the standing time, as that often amounts to four hours in a day."

"Another point which I want to make plain is this: That this question of wages is regulated by demand and supply. The same laws that control the price of butter control the price of labor. We were paying our men higher wages than the market rate, a fact which is proven by the other fact that we have secured all the men we need to run our cars at better terms for us than we offered our men."

Mr. Lewis when asked if any of the cars had been injured replied, "About 600 out of 830. On one line alone 900 panes of glass were broken. As an estimate I should say that about ten miles of wire were destroyed. Two poles were cut down. I do not think the damage to the plant will exceed $100,000."

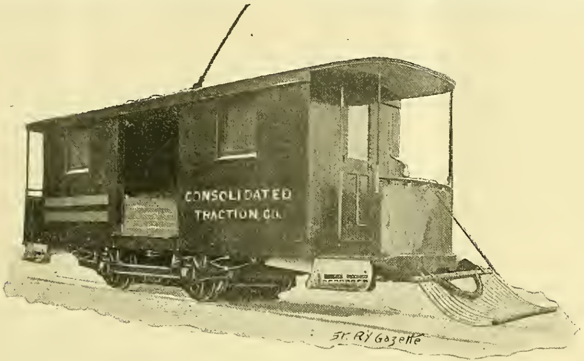
C. M. Wicker, President and General Manager of the Brooklyn, Queens County & Suburban Railroad Company, was the next witness. He stated that on his road electric cars ran at the rate of seven miles an hour, including stops. He stated that the number of accidents was less than under the old system, but they were more serious. He did not think that it required much more skill to operate an electric car than to drive a horse car. In reply to a question regarding the requirements of traffic Mr. Wicker said:

"There are three rush hours, morning and night. It is necessary to put on extra cars at that time. We could not afford to put on three regular cars for each tripper. The men claimed that our time tables were not made up with good judgment. On Wednesday after the strike began we offered to let the men make the table and agreed to adopt it provided it did not increase our headway, accommodated the public and did not increase expenses. This proposition was declared to be fair by the State Board of Mediation and Arbitration and was agreed to by the committee of laborers. We refused, however, to discharge any of our new men and consequently our compromise was not accepted."

Sheboygan, Mich.—The drivers on the street railway line struck recently because they were dissatisfied with the policy of the superintendent toward them. The matter was amicably settled.

NEWARK AND JERSEY CITY ELECTRIC RAILWAY FREIGHT SERVICE.

The accompanying illustration shows one of the new express cars which the Consolidated Traction Company of New Jersey will operate between Jersey City and Newark. Depots for receiving and delivering packages will be located at convenient points on the road, and sidings will probably be extended into several of the large manufacturing establishments along the line. The running time between Jersey City and Newark will be 45 minutes. The three cars which the company has already had built are at the present time employed in transporting tools and supplies to various points along the company's several lines, but in the near future they will be put in operation in the regular express service. The cars are substantially built, and resemble the regular express cars employed on steam roads, except that they are considerably smaller. The bodies are 18 feet in length, and have sliding doors at the side and platforms at each end. The cars are mounted on McGuire Columbian trucks, and are equipped with two G. E. 800 motors of 25 H. P. each and Westinghouse type G. controllers. The exteriors are painted yellow, with the name Consolidated Traction Company in neat letters on each side. The interiors are finished in white, and are lighted by five 16 C. P. lamps arranged along the centre of the ceiling. Each car is equipped with a Field fender. If this new service proves successful, and there is every reason to believe that it will be, the company will probably operate express and freight cars on several of its other lines.



FREIGHT CAR OF THE CONSOLIDATED TRACTION COMPANY.

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CLAIMS AGAINST STREET RAILWAYS.

"We view with some alarm the fast-increasing number of claims being filed in the courts against our company for damages sustained by parties who allege that our moving cars cause the destruction of their property or they received personal injuries therefrom," remarked a railway president, according to the *Globe-Democrat* of St. Louis. "Our watchful solicitude is wholly directed to the claim department," continued the official. "Fully half of the accidents are compromised, but the other half get into the courts, and there they drag their slow length from Circuit to Supreme. According to the State laws the damage for the cause of the loss of a life by the negligence or carelessness on the part of our employees, the sum of $5,000 can be recovered by recourse to law. As to injuries and loss of limb there is no limit, and as a result there are many $25,000 and $50,000 claims filed against us. To be compelled to pay even one-tenth of these sums is outrageous, therefore it is no wonder we adopt all the means at our command to convince the different courts that these claims are unjust. The costs are very large and lawyers do not exert themselves in our behalf for a mere pittance by any means. If the cases keep on increasing I am afraid that a day of reckoning will come, and we will be compelled to pay large sums that will make considerable of an inroad on our earnings. We are not, however, any worse off in this respect than the other companies, for we are all sufferers from a common enemy."

"Damage suits in a great number of cases can be called downright robberies," was the answer received from another railway official when asked for an opinion on suits. Continuing, he said: "We have plenty of them from the brand new to the antiquated one dating back to the time when the road was equipped with bobtails, and long before rapid transit was thought of. I do not know how many suits there are now pending in the courts against the street railway companies of this city, but am certain that the total amount of the claims is not very far from $2,000,000. This is a great deal of money for the companies to pay out if the courts say that it must be done. Then, how about the future accidents? Increase in population and increase in our business will surely bring a larger percentage, no matter how careful our employees are in running the cars. The bare thought makes me rather uneasy."

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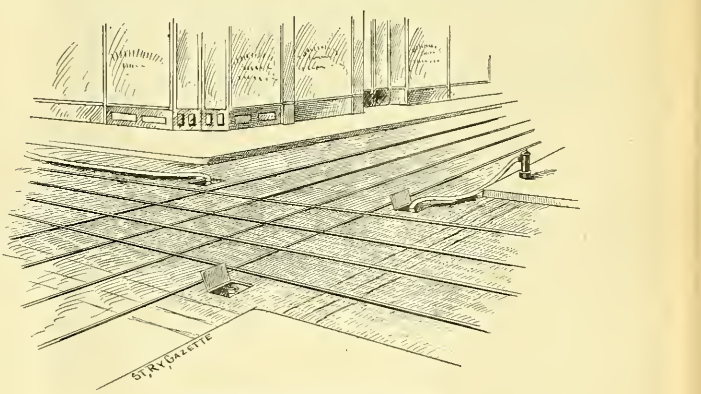
PERMANENT FIRE-HOSE CROSSING.

The blockading of cars by fire hose stretched across tracks is not an uncommon experience, and, to obviate it, Fisher Ames, of San Francisco, has suggested the plan shown in the accompanying illustration. Under the tracks a permanent pipe is laid, with the ends terminating in special manholes on the outside of the rails. A short section of hose connects the hydrant with one end of the pipe, and the fire hose is connected at the other end. For some reasons this arrangement is better than that provided by the ordinary bridge used for carrying hose across tracks. When the latter is used more or less delay is inevitable. The permanent pipe is much more expensive, however, and inspection would be necessary from time to time to insure its good condition.



PERMANENT FIRE HOSE CROSSING.

THE PUBLIC AND STREET RAILWAY STRIKES.[*]

BY WILLIAM J. RICHARDSON.

On Jan. 13, 1895, I was elected your president for the sixth time. Not having been actively and closely associated with the management of the the affairs of the Atlantic Avenue Railroad Company, of Brooklyn, for upwards of six months past, it seemed to me that I ought at once to resign, if I should again be elected; but my duty was at last made very plain, and as announced the night of the annual meeting, I will continue in the office until the time comes and the man appears during the year who should take my place.

Thus it is that I am in a position to counsel with you. May I live up to the high opportunity is my earnest prayer!

A week ago this Wednesday morning there came to my office a member of this association. He said the old men who were out wanted me to talk to them. I said it would not be possible for me to do that, because, being a director of the company, I could not do a discourteous act toward its president. He pleaded with me; said how disappointed the men would be; that they were expecting me, and he could not bear to go back to them with my refusal.

That afternoon he came again with six others, all of whom were old employees of the company, who went out in the memorable street railway strike, Jan. 25, 1889. These six men had all been members of this association, but had withdrawn from time to time. This I was not then aware of. No one of them is present to-night.

I availed myself of the opportunity to impress upon these seven men not only that they should not use violence themselves, but that they should use their influence, which I knew to be great, against violence on the part of their associates. I spoke with all the vehemence of my nature against the enormity of the crimes that were being daily committed against humanity, under the false belief that violence was justifiable to promote or advance a just cause. I told them that divine and human justice cried out for vengeance for the dastardly and awful crimes that were of daily commission in this community, and that these crimes would surely be avenged.

I have this assurance that my counsel was acted upon, and that abuse of our fellow-men has been immeasurably less by reason thereof that it would otherwise have been, especially on the lines, and in the territory traversed by the lines, of the Atlantic Avenue Railroad Company.

Let us for a while consider the character and scope of our beloved association. It was organized April 12, 1890, and has thus been in existence nearly five years. Its character was established when it adopted as its motto: "Affection and Assistance in Adversity." The spirit of love ever finds expression in the extension of the hand and the opening of the purse to our less fortunate brother and friend in his sorrow and distress.

As is well known to you, the membership is confined to those who may in any way be associated with the company, under certain proper conditions and regulations. Its scope is greater than that of any other similar society that has ever come to my knowledge. At a cost of $1 a month a member secures the payment of $200 to his widow, or next of kin, in the event of his death; $50 to himself, in the event of the death of his wife, and $50 to himself, in the event of the death of his mother, in case he is unmarried. Also, in case he is married, and has children who die under

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[*] An address delivered to the Atlantic Aid Association of Brooklyn, Feb. 6, 1895.,

16 years of age, $25 is paid to him therefor, for each child.

This is not all. In case of illness or accident to the member, he is paid $1 a day for six months should he be disabled that long, and if longer, 50 cents a day for the remaining six months of the year. Medical and surgical attendance is furnished the member at the expense of the association. All this at a cost of $1 a month, and the certainty of receiving the money the day the claim is made, provided it is a just one, whether on account of death, illness or accident.

Finally, he may deposit with the treasurer of the association, who, as the constitution declares, shall be, is the treasurer of the railroad company, such sums of money as he may be able to save from time to time, and receive interest thereon at a certain higher rate than can or will be paid by any bank or other savings institution.

The integrity, safe custody and proper distribution of all moneys and securities belonging to the association are guaranteed by the railroad company.

It is not necessary here to record the work the association has done; its praises are in the mouths of all who have known its financial history; and the good accomplished by it in the development of brotherly feeling and in the alleviation of human suffering, is the best reason for its continued life and prosperity.

Is it any wonder, then, that in such a time as this its president should respond to an appeal to counsel the membership of such a body? I should have been false to the trust that had been reposed in me had I failed to come before you. The constitution provides that the president shall call a meeting at any time when requested to do so in writing by 25 members, but only after the lapse of a week, during which notices shall be posted at all the depots. On these conditions only could I act.

The demand was duly made, the notices posted, and I have come at the earliest possible moment.

What, in brief, are the causes which have brought about the present condition of affairs? There are three parties concerned—the public, the railroad companies and the companies' employees.

The difference between the latter two parties has been the immediate cause of the situation; the primary cause is the sin of the party most guilty, namely, the public. As to the other parties, the railroad companies and their employees, I am not at liberty to discuss at this time, either in their relation to each other or to the public. In regard to the railroad companies, as the Secretary and Treasurer of the American and New York State Street Railway Associations, I am their servant, inasmuch as all the companies involved are members of both associations.

In regard to the companies' employees, at the time of the lockout and strike, I, having been chosen by their representatives as referee, I am perforce prohibited from considering at this time any matters of difference between them and the companies.

As to the public, however, I am a free lance, and if the sharp point of the dart pierces the body, it is with the knowledge that the one who inflicts the wound thereby also suffers.

Who are the public? In the first place, the people of the State of New York, and in the second place the corporation known as the city of Brooklyn. It is from the former party that the railroad companies in question received their corporate life in the first instance, particularly, by special acts of the Legislature. Who gave these chartered rights to the companies? The people. How? by their duly elected representatives in Senate and Assembly. Who are they? Men chosen from all over the State, the farmer, from the backwoods of St. Lawrence County, having as much to say about the construction of a railroad in the city of Brooklyn, county of Kings, which city he may never set foot in, as the man who lives on the street where the road is to run.

How were these men chosen? By the people, according to law; secondarily by the voters, the citizens of the State, but primarily by the politicians in the primary.

The people living in a free country have it within their power to send men to represent them in legislative halls, who, "like Cæsar's wife, shall be above suspicion." So long as American citizens neglect the primary, from apathy, carelessness, thoughtlessness mistaken idea of being contaminated by association with the men who believe that "to the victor belong the spoils," and who measure their political interest by that standard, just so long will the people be misrepresented in law-making Assemblies.

Let the cellar in the house be neglected, and gather filth; let the sewer gas escape there, and the upholstering in the parlor may be never so costly, the surroundings all that heart could wish, yet disease and death will surely pay the penalty.

The unprincipled man in the community is always at the primary, striving for unworthy ends, because his purposes are selfish, and the upright man, who neglects his duty there is responsible for the wrong inflicted on the community by the nomination of an unworthy candidate for the suffrage of the people.

My heart has bled as I have regarded the sufferings of women and children these last few weeks, in the homes and on the streets, during the intense cold and bitter winter weather, as the result of the so-called "tie-up." They and the upright man who has discharged his duty at the primary are the ones who have specially had my sympathy. Let me urge you, my friends and associates, never to allow even your church obligations to interfere with the awful responsibility that rests on you as American citizens, when the night of the primary comes for the nomination of candidates for office.

At the time the special acts hereinbefore referred to were passed the State was paying its Assemblymen the munificent compensation of $3 a day and their mileage, for a session of nominally 100 days, but which usually extended 20 days longer; practically four months, the first four months of the year at that, are taken from a man's normal business, and the State considers her servant at Albany well paid in most part by the prefix of "Honorable" to his name. The people are dishonest when they forget that "the laborer is worthy of his hire," and until in this respect the people experience a change of heart they need not be surprised if "the sowing of the wind is followed by the reaping of the whirlwind."

What is a street railway company? It is spoken of as a "soulless corporation." It is not a thing, but a personality, in the sense that it is made up of individuals, human beings, men and women whose money is legitimately invested for an honest return.

The treatment received at the hands of the people through their representatives is not honest, it is most unjust.

The ingenuity of the Legislature is taxed to its utmost to conceive ways in which to draw the very lifeblood out of a street railway company.

The company is taxed on its capital stock, on its gross earnings, its dividends, its real estate, its tracks, and finally must pay a license for running its cars overs its own rails above a payment it does not use, though it has paid for it, as well as between tracks and two feet outside thereof.

Why, let me ask, should the State have a different system or basis of taxation for corporate property, from what it has for individual property?

But again, every year, as any one knows, who knows anything, bills, suggestively called "strikes," aimed at the very heart of street railway corporations, are introduced in the legislature by the representatives of the people.

To come a little nearer home, what can be said of the justice that is oftimes meted out to the railroad companies by the people, when a suit for damages goes into the hands of a jury to determine?

But, why linger on the subject? A few thoughts have been given to make good any proposition that both the companies and the employees have been more sinned against by the public than sinning themselves.

Shall we not hereafter strive to do our whole duty, as American citizens, and esteem the duty a privilege? As through suffering from sin causes an uplifting of personal character, shall we look for an awkward public conscience by reason of the suffering borne by the people of this community?

What then are the lessons and demands of the hour? The very existence of the association is in jeopardy. You well know how I have guarded its life from harm; how, when it has struggled at times, I never lost faith in its high aim, in the work it was designed to accomplish, especially in harmonizing all discord that might arise among its members and the servants of the company.

The occurrences of the last 25 days have made me wonder whether the ship, staunch and noble though she be, will weather the storm and outlive the gale. Shall we not make every honest effort to save the vessel? Is not your duty and mine manifest? Can we conscientiously, any of us, do aught at such a time as this, in opposition to the foundation principle of our order as expressed in our motto: "Affection and Assistance in Adversity."

We have consciences; we are men, grown, all of us; we know what is right and what is wrong. Every member of this association knows whether his purposes have been unselfish, his methods honorable, and his spirit toward his fellow-men noble.

If any member has failed to "avoid selfish purposes, dishonorable methods, want of candor or a malicious and vindictive spirit," as the two only surviving founders of a great fraternity (both upwards of 80 years of age), have thus recently counseled their followers to do, then, by so much as one has done otherwise, he has injured the cause he has so mistakenly tried to uphold, and by just so much has the cause deserved to fail.

I know that in every fold there are some black sheep, and in every religious, benevolent or philanthropic organization some will be found whose motives are impure, and whose morals and methods are worse. It would be strange if the Atlantic Aid Association were any exception. Associates, let it not be said of any member of this association, at least from this time forth, that he has been guilty of any act of violence; but, on the contrary, as an association, shall we not pledge ourselves to use all the influence and power at our command to enforce the law as law-abiding citizens, and thus, as soon as possible, restore order to the city in which we and our families live?

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REPORT OF THE BOSTON SUBWAY COMMISSION.

The Boston Subway Commission has submitted its report and the rapid transit enthusiasts in that city are confident that the local transportation situation is now likely to be vastly improved.

The construction of the subway will, beyond a doubt, greatly relieve the congestion of which such bitter complaints have been made. The engineers express the belief that in the construction of the tunnel no serious difficulties will be encountered. A summary of the report follows:

It has been customary in the past in building subways or tunnels to adopt the method of construction known as the masonry arch. The instability of this method of construction when the lateral pressure is removed, as is likely to be the case, especially in our narrow streets, when new sewers are built or new pipes are laid, and also the unprecedented cheapness of steel at the present time, has led the commission to adopt as its standard of construction steel embedded in cement, with arches of brick or concrete turned between the steel girders.

Before adopting this method of construction, the commission fortified its conclusions by securing the indorsement of engineers of national reputation, and its decision has since been still further strengthened by the report of the commission of experts on the New York subway project, which commission has recommended that a construction of steel be substituted for the proposed masonry arches.

The standard height of the subway has been fixed at 14 feet from the top of the rail to the roof, and the width for two tracks has been fixed at 24 feet, and for four tracks at 48 feet. The four-track subway will have along its centre line a row of steel columns.

Allowing three feet for space from the under side of the roof of the subway to the surface of the street makes the top of the rail 17 feet below the surface of the street, and as the platform will, as a rule, be on a level with the lower step of the car, the total ascent or descent for passengers will be about 16 feet.

The staircases to the subway are covered and inclosed, and persons standing on the platforms of the subway will be absolutely protected from the elements. The platforms are so-called "island platforms," that is, they have a track on either side of them. By this arrangement, when the access to the platform is by a staircase from above, all necessity for crossing the tracks on a level is avoided.

The portion of the subway authorized under the act which the commission now proposed to build extends from the junction of Shawmut avenue and Tremont street, down Tremont street to Boylston, and thence under the mall of the Common to Park Street Church, thence under Tremont street to Scollay square, and from there to a terminal at the Union station. In addition to the foregoing, a branch is to be built, beginning at a point in the Public Garden near the junction of Church street and Boylston street, and thence running along the line of Boylston street, under Charles street, and under the mall of the Common to a junction with the line first indicated, at the corner of Tremont street. Until a branch subway is built under Park square to an exit in Columbus avenue, cars coming in over Columbus avenue which are to enter the subway will pass through Berkeley street to Boylston, and along Boylston street to the subway entrance.

The length of the subway from the entrance near the junction of Shawmut avenue and Tremont street to the Union station will be about 1⅛ miles, and the distance from the Boylston street entrance to the Union station is about the same. The total length of track in the subway, reckoned as single track, will be about five miles.

It is proposed at first to construct only two tracks from the junction of Shawmut avenue and Tremont street to the corner of Boylston and Tremont streets; but these two tracks are to be so constructed as to allow of the addition of two more tracks when desired. It is also proposed to build at present only two tracks from Park Street Church to Scollay square. Two tracks along that portion of the route will accommodate the business as well as four tracks south of Park Street Church or north of Scollay square. In other words, about one-half the cars coming to Park street and to Scollay square reverse at those points. The additional two tracks on Tremont street, south of Boylston street, will be constructed at the side of the two original tracks, while between Park Street Church and Scollay square the two additional tracks to be built in the future, when needed, may be constructed either in a sub-subway directly under the two original tracks, or in a subway following another route, unless Tremont street is widened, in which case the subway for the two additional tracks can be built on the same level as the subway for the first two tracks.

It will be seen that there will be four tracks on Tremont street, along the line of the Common, to take the place of the two existing tracks. It is obvious that each one of these tracks will have a greater capacity than each one of the two present surface tracks, for the reason that the subway tracks will be absolutely free from surface interruptions to traffic caused by people and by teams.

The commission has aimed to accomplish larger and more satisfactory results. Its purpose has been to avoid, from one end of the subway to the other, any crossing of a track for cars going in one direction by another track for cars going in an opposite direction. This purpose has, in fact, been accomplished. The methods of accomplishing it are shown in the sketches of the arrangement of tracks between Haymarket square and Causeway street and at Park street station, and more notably at the junction of Boylston and Tremont streets.

Any person who has experienced the delays and witnessed the confusion of cars at the Granary burying ground will examine with interest the plan, in itself extremely simple, by which the car whose trip ends at Park street, after depositing its passengers, passes by a loop from the in-bound to the out-bound track, going under the intermediate track, instead of crossing it at the same level, and comes to the platform of the out-bound station empty and ready to proceed as soon as the passengers can get on board, avoiding even the delay necessary where the motorman is obliged to change over from one end of the car to the other. All the people who desire to take south-bound cars go to one platform, and all the people who desire to take north-bound cars go to the other platform, and on each side of these platforms there is a track. Take, for example, the platform for south-bound cars. Certain lines of cars will always be found on one side of the platform, and other lines of cars will always be found on the other. The passengers, therefore, will naturally divide themselves according to their destination on the two sides of the platform.

A count was taken on the Saturday before last Christmas of the number of people taking and leaving the cars at the various stopping points from West street to the head of Bromfield street. This count was taken for the purpose of determining what should be the capacity of the station platforms upon which the business of all these stopping places is to be concentrated. It was found that the total number of people who got on or off the cars within the district named between the hours f 6 in the morning and 12 at night was 63,350. Of this the number who got off from the inward or northbound cars was 27,851, and the maximum number for any one hour was 3,450, being for the hour from 8 to 9 A. M. The number of persons who got on the outward or southbound cars from 6 A. M. to 12 midnight was 30,027, the maximum number for any one hour being 3,406 for the hour from 5 to 6 P. M. These figures are interesting as showing what work the station platforms will be called upon to do.

The designs prepared contemplate the use, when needed, of fans between the stations to exhaust the air and secure thorough ventilation of the subway. Fresh air will be drawn in at the stations and will flow in each direction to the ventilating fans, where it will be exhausted through special openings at the side.

The subway will be brilliantly lighted by electricity throughout its entire length, the current for which will be derived from a special plant.

With regard to the temperature the subway will be somewhat cooler in summer and warmer in winter than the outside air. On extremely hot days, as well as on extremely cold days, and especially on cold and windy and stormy days, it will be more agreeable to travel in the subway than it would be to travel on the surface.

The first portion, beginning in the Public Garden and ending at Park street, will probably be finished and in operation before the entire system is completed. Into this section the cars now coming from Huntington avenue and Boylston street and turning back at the Tremont House will enter, pass around the loop at Park street and return on their various routes. This use will at once relieve Tremont street by the Common from its present congested condition and permit an increase of cars for the proper accommodation of the public. Provision for the drainage of whatever water may find its way into the subway is made by drains laid in the ballast and leading to the lowest points, where pumps will be placed operated by electric motors. The provisions which are to be taken for securing the dryness of the subway consist in the use of a concrete invert or bottom, and in covering the entire top and sides of the subway with a waterproof coating. In filling in the earth back of the side walls, moreover, small drain pipes will be laid close to and outside the walls, so that any excess of water in the surrounding earth may be carried away by these pipes instead of tending to work its way through the walls into the subway.

The motorman in the subway will encounter no wind, no rain, no snow. The track will at all times be clean and smooth and in good condition. There will be no wagons to be avoided. There will be no children to be looked out for. There will be no people dodging out from behind cars or suddenly determining to cross the track, oblivious of an approaching car. There will be no people crossing the track at any point. There will be no delays in attempting to cross tracks occupied by cars going in an opposite direction.

At present over 30,000,000 passengers are carried each year over some portion of the route covered by the subway. These 30,000,000 people, and at least three times that number, after the subway is completed, will be able to go from one point to another within the subway in one-half the present average time, and they will be relieved from the absolute uncertainty which now exists owing to street blockades. Within the subway the cars will run on schedule time. They will move with the same certainty as trains on a steam railroad. The passenger who wishes to take a train will know that it will take just so many minutes to reach the station and that he can reach it more quickly by the subway than by any other method.

YOST FENDER.

The Yost fender, which is the result of many months of experimenting by practical street railway men, is shown in the accompanying illustration. It is a pick-up device and it is carried, when in its normal position, partly under the platform of the car and high enough above the track to pass over all ordinary inanimate obstructions. It is thus out of the way, inconspicuous and unobtrusive, but ready for service.

Fig. 1 shows the fender in the position described. The platform is about 8 inches above the track, although it can be hung lower or higher if preferred, and the front edge projects about 18 inches from the dashboard, just far enough to throw a person struck towards the car and on the fender. The weight of a two-year-old child falling on the fender will throw it down and out, automatically, to the position shown in Fig. 2, when the platform is extended 3 feet in front of dashboard and its forward edge is 1 inch above rail. This automatic action is provided to meet the occasional emergencies when the motorman has no time to act. Ordinarily he has several seconds, and a slight turn of the lever—placed so as not to interfere with brake or power lever—throws the fender into position shown in Fig. 2. The fender can thus be placed ready for action in less than a second, and when in this position, it is stated, not even a cat can go under it. The fender can be dropped, power turned off and brake put on in less than two seconds. Repeated tests under all varying conditions have, it is claimed, demonstrated the efficacy of the appliance.

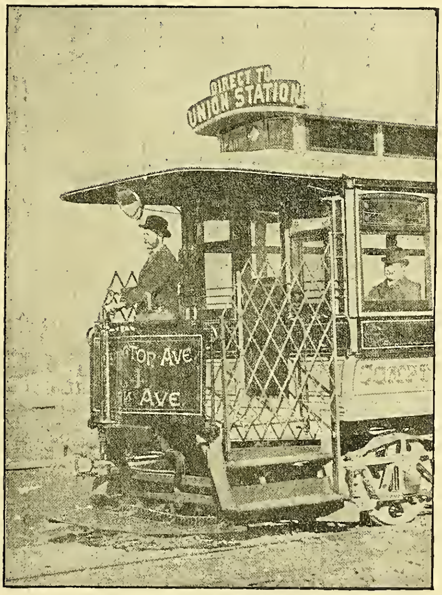


Fig. 1.—Normal Position of the Yost Fender.

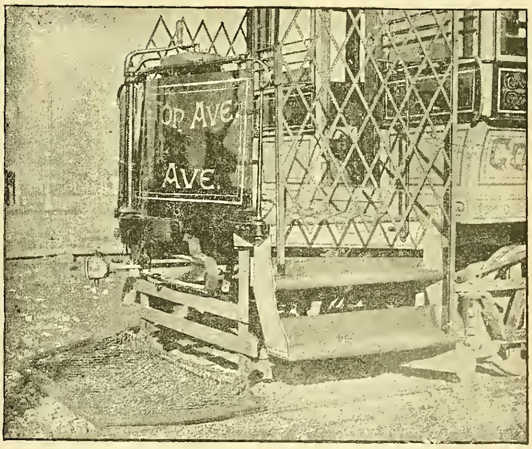
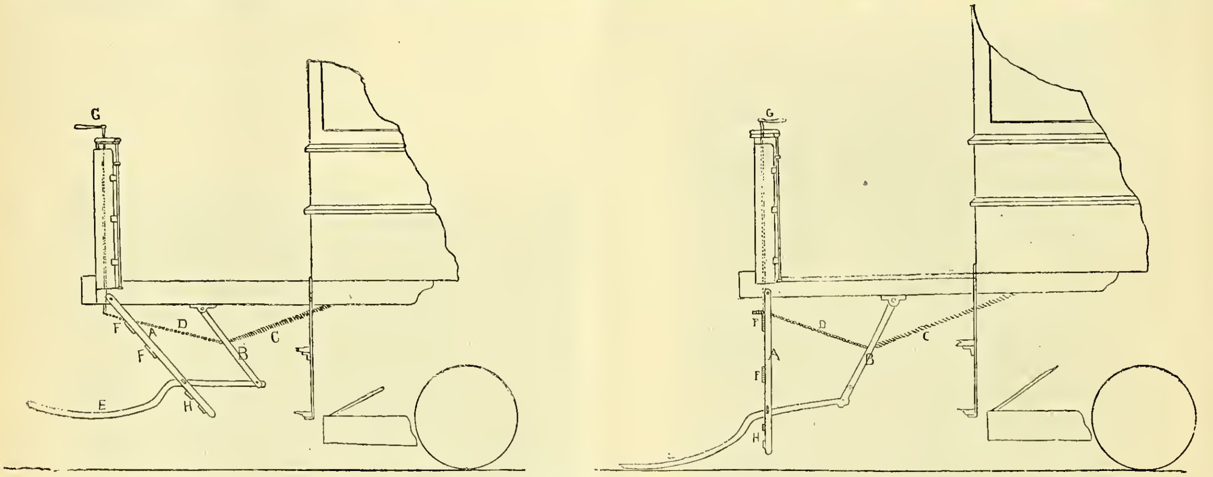


Fig. 2.—Accident Position of the Yost Fender.

The Yost fender consists of a strong wire platform three feet in width and as long as the body of the car is wide. This platform is suspended by four upright hangers, Fig. 3, two in front connected to a rocker shaft and two behind bolted to side sills of car platform. A coiled spring is attached to each of the back hangers and to the sills, and a three-eighth-inch chain connects with controlling shaft on dashboard. The spring draws the fender back to its normal position, Fig. 1.after action and holds it there; the chain, through the agency of a short lever attached to controlling shaft, which the motorman pulls toward him about six inches, throws the fender into the accident position, Fig. 2, where it is held by a spring dog connecting with a controlling shaft's ratchet. To release the fender the motorman merely pushes the dog forward with his foot, when the fender instantly returns to its normal position.

The wire platform is padded on front and side with heavy rubber hose which forms a perfect cushion. Above this platform and across front hangers are two slats which prevent a body from being carried through over the top of fender, and below the platform, similarly attached, are two other slots, which perform a similar office should the person struck chance to be drawn under the fender screen. This latter is highly improbable, but the contingency is provided for.

The Yost fender is extremely simple and is composed of cast steel, wire and wood, and has only 15 parts, all of which are strong, and may be manufactured in street railway repair shops. It is introduced by C. S. Yost, of St. Louis.



FIGS. 3 AND 4.—ELEVATION OF YOST FENDER.

A. Front Hanger. B. Back Hanger. C. Returning Spring. D. Chain which draws Fender to Accident Position. E. Platform of Fender. F. Slats across front of Fender above Platform. G. Controlling Lever for Motorman. H Slats across front of Fender below Platform.

LOW RAIL JOINTS OF STREET RAILWAYS AND THEIR PREVENTION.*

BY N. S. AMSTUTZ.

Recent conditions of street railroad traffic have developed one thing above all others needing careful attention, viz., poor rail joints. With the old equipments, the rail joints were able to withstand the traffic much longer than very heavy rails do under the impositions of recent traffic requirements.

The horse-car traveled slowly, its weight was but little compared to the modern "motor," and in consequence where a low joint existed the trouble was not aggravated to the same extent as it now is. Then the change from good to bad was so gradual that the patronizing public made small note of it. Now the changes are so rapid that they cry out against them, and the loudness of the complaints keeps pace with the speed of the vehicles of transit.

A difference of level between the adjoining ends of rails, that under the old regime was negligible, under the new is of the gravest importance. This is not due alone to the heavier equipments used, but also to the greater speeds at which the cars are run. The blows at slower speeds, as the car wheel dropped but a thirty-secondth of an inch from one rail to another, were but "tack hammer" forces in contrast with the "steam hammer" effects produced by the heavy motors of to-day at their higher speeds.

The steam railroad does not have the same conditions to contend with, since the rails themselves are not imbedded in the earth, as street railway rails invariably are where the track is laid in a public highway.

The street-railway practice makes possible the most disastrous combination of circumstances, which becomes a constant drain upon the resources of the tramway company. These causes are chiefly due to—

1st. Allowing water to accumulate at a rail joint between the rails and the paving or the adjacent earth during the rainy weather. This implies the retention of water at a rail joint after the rest of the street is comparatively dry.

2d. Joints becoming loose.

3d. Allowing loose joints to remain so until the rails have a decided "set" downward at each end. This usually follows when the joints occur between the ties.

4th. Allowing the puddling chambers at joints to exist whereby the tamping under the adjoining ties is removed, and the most favorable conditions are created for producing "set" rails.

5th. Allowing the differences in level between rail ends to continue to exist, wherein seems to lie the prime cause of most all of the street railway track ailments.

In the construction of the new track it is almost impossible to get perfect alignment, even though the rails are all rolled from the same rolls. Where the rails are placed in position at once after being received from the mills, there is not so much liability of a difference existing in the levels of their tread portions, but if they are allowed to lie along the roadway in all kinds of weather, some ends exposed more than others, it certainly would seem as though the absolute sameness of cross section at the ends would be destroyed because of the scale formations, etc.

When rails are laid with an expansion space between their ends, the plans herein outlined would not be so efficacious, but with rails laid without the expansion space, which recent experiences with welded rails seem to show is not necessary, the proposed remedies would, I believe, be specially pertinent.

Just as surely as a difference of $\frac{1}{64}$ in. exists between the levels of adjoining rail ends, so surely will the heavy motors find the difference and aggravate it.

If the weight of the car comprised only pig iron, then the disastrous results would bear heavily only upon the tracks, but unfortunately the greater portion of its weight is made up of electrical machinery, worthy of better treatment.

The ultimate effects of hammering on single track roads would not be so great as in double track systems, where the traffic is all in one direction; but when it is considered that under a five-minute headway an aggregate of 840 blows per week are delivered by a car operating 10 hours a day, each succeeding blow being slightly heavier because of the increase of drop which is constantly produced, the seriousness of this influence will be appreciated. Even with the heavier rails and "channel" fish-plates which are now being used, the damage due to this cause is not entirely removed. It is therefore of the utmost importance that a preventive should be used, so as to insure the maintenance of the best possible conditions for the preservation of the track and the car equipments.

Directly along this line I would propose the following procedure for old as well as new track. These deductions are based upon a number of years of careful observation of the older horse-car and the more recent electric track constructions.

For old tracks, it would be most expedient to—

1. Carefully inspect the track, and locate all the loose joints.

2d. Re-tamp the ties located adjacent to a low joint.

3d. Cement or otherwise fill in the space which exists between the web of the rail and the paving up to and beyond the adjacent ties. This would prevent accumulation of water, and in a great measure be beneficial in preventing the open spaces between the ties and the earth beneath, which are formed by constant vibration when water is present.

4. Carefully surface up the rail ends where they meet, in the manner hereafter described.

With new tracks the plan proposed would be somewhat as follows, viz.:

a. Using the new track for at least a day before the track is finally aligned.

b. After the day's use, retamp the ties, and finally align the track.

c. Surface the rails before paving.

d. Cement the spaces under the rail head, as set forth in the division (No. 3) preceding.

e. Re-surface the rail joints after one or two weeks' use.

f. After a few months inspect the track with the indicator to locate defective joints.

The maintenance of a repaired or new track is much the same, and it is a case where eternal vigilance becomes the price of good track. All the troubles recounted can usually be traced to a slight inequality of the rail ends.

A slight drop sets the rails into vibration, and if the process is continued for a time, the fish-plates will surely become loose at one end or the other, and then the matter goes from bad to worse until both ends are loose, when it is but a question of a short time when the rails will be "set" and the track almost irreparably ruined.

Numerous attempts have been made to re-align old tracks having "set" rails therein, but the result has invariably been unsatisfactory. No amount of doctoring short of straightening the rail (which is impracticable) will remedy the matter. The old adage, "An ounce of prevention is worth a pound of cure," is certainly as true when applied to street railway track preservation as elsewhere.

The watchword of the day is *prevention;* this is the key to the present propositions, in that the conditions which make possible all the ills to which a street railway track is subject might be eliminated by timely preventive measures far more easily than they can be cured after having once come into existence.

The surfacing car which I would propose for the purpose may be described as follows:

It may consist of an ordinary truck with a special housing built thereon, with tool box conveniently placed at each end, on the outside, so as to be easy of access. It should have suitable couplers, and a single motor connected to the front axle, with an ordinary car controller directly in front and a brake located within easy access. A lamp should be placed under each canopy and a cluster of three lamps placed on the inside. The surfacing mechanism is made in two units, one on each side of the car, so as to serve both rails simultaneously, if necessary.

This mechanism may be described as follows: It consists of a rapidly rotating emery grinder having bearing at the end of the short arm of a bell crank lever; the long arm carries a pivoted nut which is moved laterally by a worm shaft, having one or two hand wheels thereon; the worm shaft is supported upon a suitable frame which rests on the car floor. The lever is fulcrumed at the "knee" in a hanger secured beneath the car floor, and the emery grinder is connected to a stationary motor by a flexible shaft in any suitable manner.

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* From "Electricity," New York, N. Y.

If desired, the flexible shaft could be connected to a counter shaft through the medium of a clutch; this latter arrangement in some respects would be preferable, because either of the grinders could then be disconnected at pleasure without effecting the other one. The usual starting box, etc., would be provided for the stationary motor.

The operator is enabled to see the progress of the work through a slot in the car floor, and the speed of travel could be as fast as the special requirements would call for.

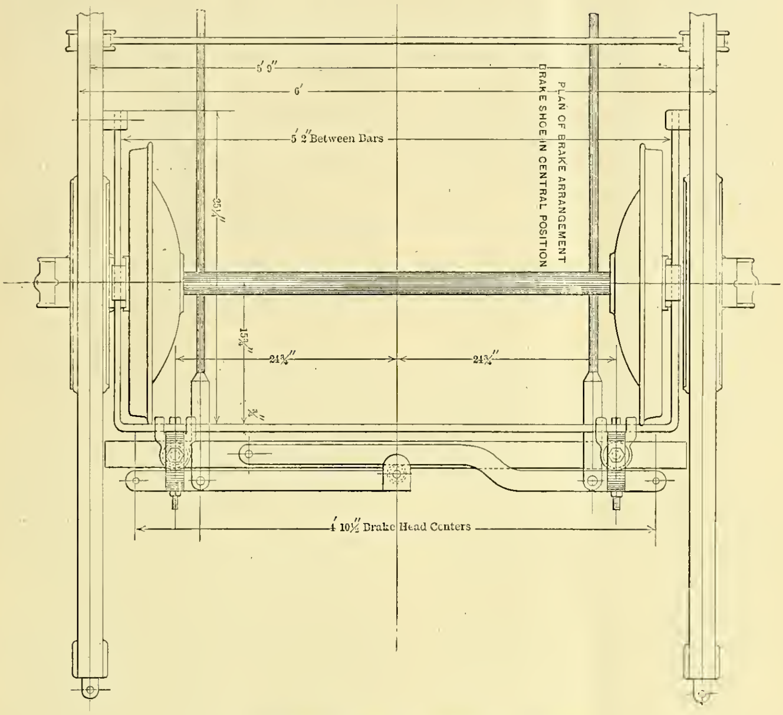
5′ 9″
6′
5′ 2″ Between Bars
35¼″
15¾″
21¾″
21¾″
¾″
4′ 10½″ Brake Head Centers
PLAN OF BRAKE ARRANGEMENT
BRAKE SHOE IN CENTRAL POSITION

FIG. 2.—GRAHAM EQUALIZED BRAKE SUSPENSION.

In order that the surfacing might be done at night time, so as not to interfere with the ordinary day traffic, lamps are hung under the car floor, near the grinders, in suitable protecting guards. The reflection on the cleanly ground surfaces of the rails would very readily indicate the progress of the work.

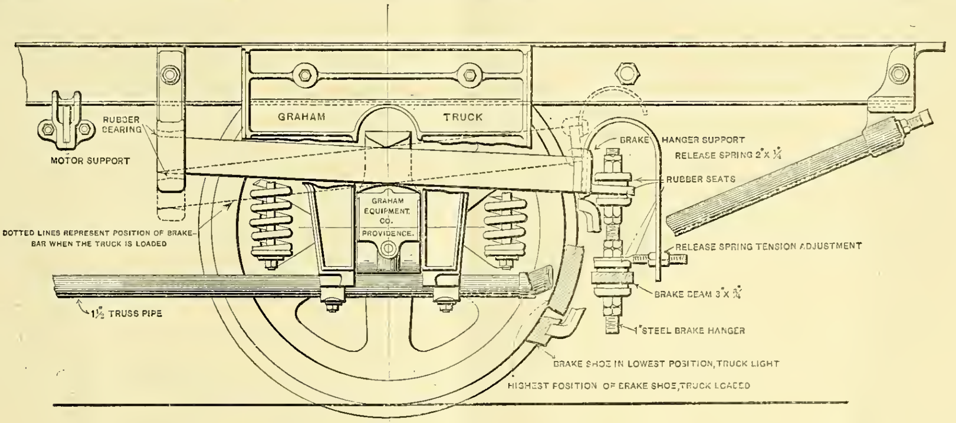
GRAHAM
TRUCK
RUBBER BEARING
MOTOR SUPPORT
GRAHAM EQUIPMENT CO. PROVIDENCE.
DOTTED LINES REPRESENT POSITION OF BRAKE-BAR WHEN THE TRUCK IS LOADED
1½ TRUSS PIPE
BRAKE HANGER SUPPORT
RELEASE SPRING 2″ x ¼
RUBBER SEATS
RELEASE SPRING TENSION ADJUSTMENT
BRAKE BEAM 3″ x ¾″
1″ STEEL BRAKE HANGER
BRAKE SHOE IN LOWEST POSITION, TRUCK LIGHT
HIGHEST POSITION OF BRAKE SHOE, TRUCK LOADED

FIG. 1.—GRAHAM EQUALIZED BRAKE SUSPENSION.

A *very little grinding* at each joint will suffice, and this can be repeated as occasions demand.

The "grinding car" would be of special importance in surfacing down new work, such as switches, cross-overs, etc.

In addition to the surfacing or grinding car, I would also propose a mechanical track inspector on the plan described below. This could be drawn over the track by an ordinary motor or the surfacing car. Its function would be to automatically indicate the location of low or defective rail joints, so that they might be repaired as early as possible. This car consists of a four-wheel truck with any suitable frame, provided with two indicating wheels mounted upon the same axle. The bearings of this axle are free to slide up and down in the central housings, as the inequalities of the track are passed over, while the end axle bearings are held rigidly upon the truck frame.

The central axle bearings have connected therewith a bell crank lever which has its fulcrum pivoted on the central bearing housing, and its longer arm is connected by a link to a sliding valve. This valve regulates the flow of any coloring matter which is contained in a tank placed for the purpose on the truck. Two spouts lead from the tank, one on each side of the truck, terminating so as to deliver the coloring matter as near the rail joints as deemed desirable.

The action of the device is as follows: When either one of the central wheels passes over a low joint it moves downward in relation to the truck frame; this moves the belt crank lever, and opens the valve in the spout and allows the color to discharge upon the paving or the ground, or the rail, if this be thought best. As soon as the central wheel moves from off the low portion of the track the valve is closed. If the coloring matter in the tank is in liquid form, the valve should simply be perforated. If in the form of powder, the opening should be ample to guard against clogging.

The valve can be actuated as delicately as desired by changing the link connection to the bell crank lever.

GRAHAM EQUALIZED BRAKE SUSPENSION

In the accompanying cuts are shown an elevation and plan of the Graham equalized brake suspension, which, it is claimed, enables the motorman to stop his car easier when it is fully loaded than when empty, as the relative position of the shoe to the wheel in the former case is nearer the center. Fig. 1 shows that the end of the brake bar is attached to a casting bolted to the I-beam. The brake bar rocks in a jaw cast solid on the axle box. To the rear end of the brake bar is suspended the brake beam. The brake hanger deserves careful study. A malleable iron clip is bolted to the brake bar which holds the release spring and an inch steel rod supports the beam with check nuts, at the proper places. On each side of the suspension bracket are two pieces of 1-inch rubber held in iron cups; on each side of the brake beam there are two pieces of 1-inch rubber, also held in iron cups. Between the check nuts and the iron cup above the brake beam there is a tension adjustment enabling the repair man in the shop to give exactly the proper strength for releasing the shoes without causing extra labor to the motorman. This method of hanging the brake beam in rubber makes it noiseless and also gives the shoe a much better chance to take hold of the wheel.

To a practical man the result of loading a truck is apparent. As the truck frame goes down as a result of the increased load, the brake bar fastened to a clip on the I-beam must also go down; and as the end supporting the brake beam must travel upward, the shoe occupies the most desirable position on the wheel nearest its center.

The brake rigging is the invention of J. H. Graham, the president of the Graham Equipment Company, and is one of the cleverest ideas that has been added to the truck. This system is suitable for any truck, and it is the intention of the company to place it upon four-wheel steam trucks and four-wheel double trucks or electric cars. All the trucks now being built by the Graham Equipment Company will be fitted with this brake rigging.

STREET RAILWAY POLICE WANTED.

The Massachusetts Street Railway Association has petitioned the Legislature to pass a measure authorizing the appointment of street railway police. The purpose is simply to empower the authorities of any town or city to appoint special policemen, whose whole duty should be to ride on the cars of the local street railway companies, with authority to put off or arrest all disorderly or otherwise obnoxious passengers. It is stated that at the present time if conductors eject a troublesome passenger the railway company is liable to a civil suit. The companies, therefore, do not allow their men to use force, If a conductor can persuade disorderly or drunken passengers to leave the car, the other passengers are satisfied; but he must not lay hands on them. Trouble from this source is met with chiefly on the late cars between a city where liquors are sold and a no-license suburb. In the vicinity of Boston it is experienced mostly on the lines running out to Cambridge and Chelsea, but the same trouble is met with in other parts of the State, as for instance when Lawrence is no-license and Lowell saloons are open. By the proposed plan, a small force of special officers, probably not more than three or four in each town, would be appointed to preserve order on these late cars.

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FRAUDULENT ACCIDENT CLAIMS.

The amount of money out of which street railway companies are annually defrauded is no-likely to be overestimated by the statistician. In suspicious cases there is too often a tendency to settle with claimants to ward off the possibility of lawsuits, for juries are proverbially inclined to deoide against transportation companies regardless of the merits of the claims. It is always a satistfaction to note instances in which these frauds are brought to light, and a swindle of this kind of exceptional interest has just been exposed in Brooklyn.

A man who stated that his name was Hyams and that his home was in New York City, recently presented a claim against the Brooklyn Heights Railroad Company for injuries alleged to have been sustained by his wife as a result of an accident in an electric car. He made the following statement:

"On Tuesday afternoon. Dec. 4, at about 4:55 P. M., I hailed car No. 2,328 on Myrtle avenue, at some street near Fort Greene Park. My wife was with me. The car stopped. My wife got on first and I followed. Before my wife or I could get to a seat the car started up with a sudden jerk and my wife fell and hurt her back. Dr. Block called on her to-day. He said my wife was suffering from concussion of the spine. He said he thought it would be a permanent injury. He told me aside that he thought it would result in paralysis. Up to the present time she has carried on business as a dressmaker. Her injuries, should they be permanent, will prevent her from ever carrying on her business as such again. Since retiring on the night of the 4th she has been confined to her bed. She suffers great pain. She cannot move her lower limbs. Since the accident I have not attended my business. Of course my wife has not attended to hers. My doctor says it is a very severe injury. She complains of pains in the head, but there is no mark. There is a bruise on her back. When she got on the car I stopped on the platform to pay the conductor. My wife entered the car. There was seating room up near the front door on one side of the car, but the seats, all of them, near the back platform or door were filled. My wife while walking through the car did not assist herself with the straps. When the car started suddenly she fell and struck her back on the seat—the edge of a seat. Then she slid off on to the floor. Several men rushed forward to her assistance and then I rushed in and lifted her to her feet. When the conductor asked her if she was hurt I told him no, but he asked her and she answered 'yes.' The conductor said it was an accident and could not be helped. I do not want to put in any claim as yet, but I do want the company to send their doctor to see my wife."

The company assigned one of its claim agents to examine into the case, and he found the woman in bed in an apparently serious condition. The attending physician stated that he did not believe the woman was shamming. He convinced the company's physician that there was no mere simulation of paralysis. In the presence of the latter a test was made by pricking the woman's foot with a needle when she was not looking; she did not wince.

For some reason that does not yet appear the claim agents were not satisfied, and it was decided to keep a watch on Mr. and Mrs. Hyams. It was then found that the latter was very far from a paralytic. When she supposed herself secure from all observation her physical ailment disappeared entirely. It was discovered that she was very active and quite merry. She and her husband were singing duets in their apartments two days after the alleged accident. She was also caught scrubbing the floor, doing the family washing and other light work of that character when her husband was representing that she was a paralytic.

The claim agents secured an affidavit from Hyams in which he alleged the continuance of his wife's trouble, though he admitted she was gradually improving.

He agreed to settle for $300 on this account. He declared that his wife was not on any occasion out of her bed between Dec. 7 and 22. The truth was, she had done the housework and the marketing and had gone out many times with her husband, beside making the acquaintance of the neighbors and spending several evenings in their apartments.

Being put off from time to time. Hyams threatened suit. He declared that his wife had had a relapse, and would be a paralytic for life. Very soon after, a summons was served in the case of Morris Hyams vs. The Brooklyn Heights Railroad Co.

The matter was now in very promising shape. It would be an easy matter to send Hyams, his wife and his witnesses, to the penitentiary if they persisted in their suit.

A few days ago the lawyer whom Hyams, had retained to prosecute the suit against the Brooklyn Heights Company, announced to a representative of the company that he had thrown up the case, as he was convinced it was fraudulent. He refused, however, to give any information concerning the interesting couple, as he had gained his knowledge in his capacity as a lawyer. The claim agents were more than disgusted with this bit of news, as they had hoped to secure the indictment and conviction of the Hyams for their attempted swindle. When an investigation was made it was ascertained that the swindlers had fled from the city.

Street railway companies will do well to keep an eye open for the Hyams. Mrs. Hyams simulates paralysis with such success that she is able to impose upon clever physicians, and it is not likely that the game will be abandoned. They are likely to turn up at some distance from New York, and before long will be engaged in an attempt to bunco some street railway company.

The last number of the *Street Railway Review* contains an article descriptive of the operations of a family named Freeman, who, it is claimed, have swindled several companies by a fraud exactly identical with that attempted by the Hyams. One is inclined in reading the article to suspect that the latter were members of the Freeman family, traveling under a new name. The *Review*, in referring to the Freemans, says:

"The disease which they use in their raids on corporations is one that baffles physicians, for it is of a nature that only time will tell whether permanent or temporary disability exists. In the cases of the Freemans, there are many of the symptoms which are simulated so perfectly that reasonable doubt existed in the minds of eminent physicians and specialists who have examined them. The only way to be absolutely certain whether a case is legitimate or not is to put in a nurse who can keep informed by constant watching that there is no shamming."

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ELECTRIC TRACTION ON THE PENNSYLVANIA RAILROAD.

The New York, New Haven & Hartford Railroad Company is not the only corporation that has decided to experiment with electric traction on a branch line. The Pennsylvania Company will equip the Burlington branch of the Amboy system with an electric system, and the contract will soon be awarded. This line connects Burlington and Mt. Holly, N. J., and is between seven and eight miles in length. If the results are satisfactory it is likely that other branches of the Pennsylvania Railroad will be operated by electricity instead of steam.

The present road-bed of the Burlington branch will not require much change, but a portion which has not been laid with the heaviest rail will be so equipped. The power station will be located at Mount Holly, and it is stated that new cars will be constructed especially for the line. The new cars will be almost as large as the standard passenger coach, and they will be equipped with motors of 75 horse-power, designed for a speed of 50 miles an hour. Each car will be provided with two motors, and trail cars may be used. The intention is to give a frequent service at high speed. The change of motive power will not prevent the use of steam locomotives on the branch, and they will probably be used, as at present, for hauling freight.

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NATIONAL ELECTRIC LIGHT CONVENTION.

The National Electric Light Association has been holding its annual convention this week in Cleveland. The attendance was large, and the meeting was one of unusual interest. The association was called to order on Tuesday morning by President M. J. Francisco, who introduced Mayor Blee, who cordially welcomed the visitors to Cleveland. Hon. James H. Hoyt, of Cleveland, followed in an address in which he gave a hospitable welcome to the delegates and invited them to view the city's varied commercial and manufacturing interests. Charles F. Brush followed with an address in which her elated "Some Early Reminiscences of Arc Lighting."

In his annual address President Francisco said:

With a nucleus of about 100 central stations in existence 10 years ago, we have to-day 2,500 such stations, representing assets of over $300,000,000, not including 7,500 isolated plants, valued at $200,000,000 more. Ten years ago the total number of arc lamps could be counted in a moment's time, now, they are like 'Father Abraham's Army,' 500,000 strong.

Electricity has converted the thunders of Niagara, which have been aimlessly beating against its rocky shores for ages, to the uses of commerce, and will soon send its reverberations over hundreds of miles of wire into distant cities, there to exert its mysterious power for the benefit of the busy toilers in their race for gold.

We may yet see electricity generated without the aid of steam; or the Empire State express flying across the continent at the rate of 150 miles per hour; our letters mailed in New York in the morning, read at the dinner table on the Pacific slope; the electric special, under an arrangement made by our master of transportation, may sail over the rugged peaks of the Alleghenies or the snow-capped summits of the Rocky Mountains, as we speed on our aerial voyage to the San Francisco convention, may even defy the laws of nature, germinating plants and fruit regardless of the sun's rays or its influence; no more ships crushed by polar ice as we fly across the wide expanse of ocean on our way to the long-sought north pole; the wild Western prairies made to blossom like the rose by the aid of the electric plow and irrigator, while the electric reaper and thresher gather in the products that the electric train delivers in the far distant markets of commerce. Through its benign influence all mankind will be at peace; the Jap and heathen Chinee embrace each other, and the smiles of the Russian bear beguile the "sick man of the East." And finally, it may be that the time may come when all it is necessary for an electric light man to do is to press the electric button, and the gold for which man has toiled for generations shall rush forth with a current of a thousand amperes.

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FINANCIAL NOTES.

The San Diego (Cal.) Cable Railway has been sold for $17,000 to George Kerper, of Cincinnati, who will operate the road by electricity and have cars running in about four months.

Shenango Road in Trouble.—Property of the Shenango Valley Electric Street Railway Company, operating five miles of track between Sharon and Sharpsville, has been seized by the sheriff in the suit of J. P. Stone, of Pittsburgh, a stockholder in the company.

Suit to Foreclose.—Application has been made in the United States Court by the Old Colony Trust Company, which is trustee for the bondholders of the Winona (Minn.) General Electric Company and the Winona City Railway Company, to foreclose on $270,000 of bonds outstanding and have a receiver appointed.

Syracuse Street Railway Report.—The report of the Syracuse Street Railroad Company for the quarter ended December 31st. as filed with the Railroad Commissioners at Albany, shows: Gross earnings, $35,2[illegible]7; operating expenses, $26,134; other income, $411; fixed charges, $23,269; net deficit, $13,774.

Boston Rapid Transit Bonds.—The first call for bonds has been made by the Rapid Transit Commission of Boston. The city treasurer has been asked to sell $1,000,000 bonds. The commission has authority to call for the issue of $7,000,000 four per cent. bonds to defray the expenses of executing the provisions of the subway act.

The Second Avenue Railroad Company, of New York City, reports for the quarter ending Dec. 31: Gross earnings, $226,[illegible]00; net earnings, $41.798; other income, $625; gross income, $42,423; fixed charges, $33.461; net income, $8,961; cash on hand, $45,548; profit and loss (surplus), $47.146. The net income for the same quarter of the previous year was $3,093.

Foreclosure Decreed.—Judge Clark, of the United States District Court, has rendered his decision in the consolidated case of the Union Trust Company, the American Loan and Trust Company and the Thomson-Houston Electric Company against the Knoxville Street Railway Company, of Knoxville, Tenn. He decrees a foreclosure of the mortgage against the street railway, and appointed Capt. H. H. Taylor special master to take proof, advertise and sell the road.

Consolidation at Ilion, N. Y.—Articles of incorporation have been filed with the Secretary of State, combining the three street car lines between Herkimer and Frankfort, N. Y., into one company, to be known as the Herkimer, Mohawk, Ilion & Frankfort Electric Railway Company. The directors and officers are: J. L. Hees, James A. Stewart, Jacob Hees, A. H. Mills, John W. Baker and E. M. Richardson, of Fonda: R. Townsend McKeever and A. D. L. Baker, of Gloversville; Addison B. Calvin, of Glens Falls. The officers are: J. Ledlie Hees, President, of Fonda; Addison B. Calvin, Vice-President, of Glens Falls; R. T. McKeever, Treasurer and Secretary, of Gloversville. The capital stock of the consolidated company is $55,000.

To Foreclose Tacoma Railway Mortgage.—The New York Guarantee & Indemnity Company, as trustee, has brought a foreclosure suit against the Tacoma Railway & Motor Company and Edna L. Mitchell. On January 1, 1894, default was made in the payment of interest. The plaintiff asks that the first mortgage held by it as trustee be foreclosed and the company's property and franchises be sold by a master in chancery under the direction of the court as an entirety and absolutely without any right of redemption, subject only to the lien of a prior mortgage or deed of trust made to the Farmers' Loan & Trust Company and amounting to $85.000, principal with interest thereon. Edna Mitchell is named defendant, having received judgment for $30,000 against the company in a damage suit.

Consolidation in Waco, Tex.—The electric street car systems and the electric light companies, of Waco, will be consolidated. The Citizens' Railway Company and the Waco Gas Company have purchased $187,000 of the $[illegible]00,000 bonds of the Waco Electric Light and Street Railway Company. The latter company is in the hands of a receiver. It operates an extensive street railway system and a large electric light plant. It became involved in financial difficulties several months ago. W. J. Hobson, of St. Joseph, Mo., was the principal owner and builder of the plant. The stock is $250,000, and bonded indebtedness $162,000 was held by St. Joseph capitalists, and $25,000 by the General Electric Company. These interests were purchased, it is understood, at 25 cents on the dollar. Henry C. Scott, of St. Louis, is president of the Citizens' Street Railway Company, and a majority of the stock is held in that city. Hon. George Clark is president of the Waco Gas Company, a majority of the stock of which is held in Waco.

Sale of the Flushing (L. I) Road.—The Flushing and College Point Railroad is to be sold pursuant to a decree of the Eastern District Court of New York as a result of the company's default on a mortgage given to the Atlantic Trust Company dated Dec. 1, 1890. The action is a part of the proposed reorganization of the road, and with this step the thirteen Flushing stockholders cease to hold any interest in the road. These gentlemen, it is stated, have invested $180,000 in the road in a vain attempt to put it on a paying basis. The sale of the road, which includes franchises, railways and track, real estate, and all other corporate property owned by the company in Flushing and College Point, will take place on Thursday, April 4. The property will undoubtedly be purchased by a company recently organized to acquire possession of it. The new company comprises Daniel Odell, E. Bayard Halstead, Paul D. Cravath, John W. Houston, V. K. McElhenney, Frank A. Dillingham, Philip F. Kobbe, Harvey Romer, and Charles Snow Kellogg, all of New York City.

NEW INCORPORATIONS.

West Chester, Pa.—A charter has been granted to the West Chester & Downing Street Railroad Company; capital, $100,000. The President is James McGraw, of West Chester.

Jacksonville, Ill.—The Los Angeles Traction Company has been incorporated with a capital stock of $100,000, to operate street railways in California. The incorporators are: Thomas J. Hook, Francis Hook and Marcus Hook.

Hull, Mass.—The Nantasket Electric Street Railway Company has been incorporated with a capital stock of $12,500. The promoters are, Jno. L. Mitchell, Geo. E. David, M. F. Taylor, Hull, Mass.; Jno. C. Flood, Boston, Mass.

Chicago, Ill.—The General Electric Railway Company has been incorporated. The capital stock is $5.000,000, and the company proposes to make, acquire, and sell inventions, improvements, patents in railway appliances and devices, and acquire and operate street railways. The promoters are Daniel M. Simmons, Wm. A. Youmans, Geo. Pfleger.

NEWS OF THE WEEK.

Newburg, N. Y.—The car sheds of the Newburg Electric Street Railway, with nine cars, burned on Feb. 14: loss $5,000.

Portland, Me.—The Board of Aldermen has granted permission to the Portland Street Railway Company to equip their lines with electricity.

Rochester, Pa.—The People's Electric Street Railway Company will in the spring extend its line 10 miles farther up the river from Freedom, the present terminus.

New York, N. Y.—The Third Avenue Railroad Company has filed with the County Clerk a notice of the proposed extension of its road eleven miles in the upper part of the city.

Springfield, Ill.—A bill has been introduced in the legislature requiring street car companies to equip their cars with vestibules. The bill is a copy of the Minnesota law on this subject.

New Orleans, La.—The street railway employees have decided not to strike for increased pay and shorter hours. They are now receiving $50 a month, and they work 12 hours daily.

Burlington, Ia.—The Burlington Electric Railway has passed from the hands of the incorporators to the Burlington Electric Light & Steam Supply Company. The line is to be extended to West Burlington and to New Park, and other improvements are to be made at once.

Columbus, O.—The Columbus Street Railway Company has offered the following prizes to its employes: For the best written report of an accident within six months from date, $25 will be given the motorman or conductor; for the second best report, $15, and for the third best, $10.

Buffalo, N. Y.—An extension of the present Buffalo & Williamsville Electric Railroad to Clarence is projected. The extension would cost about $75.000. An informal proposition has been made to the landowners between the two towns that if they pledge $25,000 the work will be completed by bonding the road for the remainder of the sum.

Keokuk, Ia.—Keokuk will be without street railway service for an indefinite period. The franchise granted J. C. Hubinger, owner of the electric railway, contained a provision that when in winter the operation of the system did not pay a part or the whole system might suspend operations indefinitely. Hubinger says the system does not pay, and has given notice that it would suspend.

Detroit, Mich.—The stockholders of the Suburban Street Railway Company have made an application for a franchise on the Grand River road, from the boulevard to the township line, between Greenfield and Redford. They offer through electric cars to the Snyder road by the first of November next, and from the Snyder road to the township line, within three years from now, or as soon as they get sufficient power to run through.

Brooklyn, N. Y.—At the last meeting of the Board of Aldermen, Alderman Cohen moved that the railroad companies pay a license fee of $20 a year for each car in their possession, and that the license should be displayed in the cars. It was also proposed that the conductors on the trolley cars should be obliged to call out the name of each street as they pass, under a penalty of $10. The resolutions were referred to the railroad committee.

Chicago, Ill.—The officials of the Northwestern Elevated Road have closed a contract with the Union Bridge Company, of New York, and the Elmira Bridge Company, to furnish the entire iron work of the elevated structure. The cost of the iron work will amount to $1,250,000. The length of the structure will be seven miles. The companies will commence work as soon as practicable, as the work is to be completed before the end of next year.

Boston, Mass.—A petition was received in the Massachusetts Legislature last week from J. H. Bickford for the incorporation of the Metropolitan Elevated Railway Company, with a capital of not less than $15,000,000 nor more than $25,000,000, the corporation to be authorized to construct, maintain and operate, by electricity or other power, elevated railways in the city of Boston and other cities and towns where the consent of the mayor and aldermen or selectmen is obtained.

Boston, Mass.—The drivers and motormen have decided not to strike for increased pay and other concessions. They have voted to attack the company instead by an effort to secure legislation. A committee has been chosen to present to the legislature a bill providing that no person shall be eligible to obtain a license as motorman to run an electric car until he has had at least nine days' experience as a motorman on an electric car with an experienced motorman of the same company on which he is to be employed.

Philadelphia, Pa.—The People's Traction Company will at once erect a temporary power station on the company's property at Ogontz for the upper end of the York road line. It will be provided with a generator of 300 or 400 H. P. The station, which is now under construction, will be finished about the middle of May, and will have a capacity of 3,600 H. P. The travel on the line indicates that additional power will be needed before the new station is finished, and therefore the temporary station is to be constructed.

Philadelphia, Pa.—During the recent snowstorms passengers on street cars have experienced no little inconvenience in getting on and off cars, as they have been compelled to step into the snow when getting off, or wade through in getting on. This is the result of the custom of stopping on the "near" sides of street crossings. In order to accommodate its passengers, the Philadelphia Traction Company has directed that the front platform gates of its cars be kept open, so that the front platform, which is near the crossings when the car stops, can be used for entrance and exit. This is probably a temporary arrangement.

Akron, O.—At a recent meeting of the directors of the Akron, Bedford & Cleveland Railroad Company the following officers were elected: Henry A. Everett, president; James Christy, Jr., vice-president; E. W. Moore, treasurer; L. E. Beilstein, secretary; Will Christy, general manager, and Charles Howland, attorney. I. Toplift, of Cleveland, was also elected as a member of the Board of Directors. It is expected that the road will be completed so that cars will be running regularly by August 1. A car will leave the center of Akron and the square at Cleveland every hour, and will be expected to make the trip in 1 hour and 45 minutes. Car fare will be $1 for the round trip.

Detroit, Mich.—Work will soon be begun on the Detroit & Mt. Clemens Electric Railway. Judge C. J. Reilly and C. M. Swift are the active representatives of the road, and the $250,000 of stock is held by some of the wealthiest citizens of Detroit. The road will be a straight line out Gratiot avenue to Mt. Clemens, and its cars will be brought into the city over the Citizens' Street Railway Company's line, an arrangement having already been perfected. The work of equipping Gratiot avenue with electric cars will begin as soon as possible, and Manager Hutchins has assured the Mt. Clemens company that he expects the road to be fully equipped and in operation by April 15.

St. Louis, Mo.—The heads of the departments and divisions of the Union Depot line have formed an organization. The following were present: Harry Scullin, vice-president and general manager; Thomas W. Murphy, general superintendent; W. C. Gotshall, chief engineer; Charles Pierson, master mechanic; David Butler, division superintendent, in charge of Benton-Bellefountaine line; Nicholas Nolan, division superintendent, in charge Mound City line; J. P. Gilbert, master car builder. Harry Scullion was elected president; Thomas W. Murphy, secretary, and Miss Dillinhamm, official stenographer. The organization was named the Union Depot Railway Company Consulting Board. After all the preliminaries were attended to W. C. Gotshall gave an interesting talk on electricity in relation to street railway work.

New Brunswick.—Work has been begun at Somerville on one trolley road between New York and Philadelphia. The contractors now at work are under bonds to complete by April 10 the first five miles of the New York & Philadelphia Traction Company's proposed electric railway between the two great cities. The first rails will be laid at Raritan, after which the construction of the road is to proceed at the rate of one mile a week until it connects Somerville and Bound Brook with New Brunswick. Between Somerville and Bound Brook the rails will be laid along one side of the public highway. Between Raritan and New Brunswick is an agricultural district. The Traction Company intends to cater to the needs of the farmers, and is having built a number of combination cars that will enable the farmers to carry with them small quantities of produce to market.

Boston, Mass.—At a hearing given by the legislative committee on street railways, last week, representatives of street railway companies were granted an opportunity to protest against the bill requiring the use of guards and forbidding persons standing between the seats, or platforms, or running boards of electric cars. Vice-President Cummings of the West End remonstrated against the bills, not because they were not good measures, but because they were impracticable. The road had endeavored to bring about just such reforms as the bills aimed at, but found it impossible to do so. On the question of running boards, Mr. Cummings said that the West End would do away with one if it were possible to have the other one always on the outside, so-called, of the car. This would be feasible if the road were able to run its cars in loop. But because they had to shift ends at various places they could not do it. J. Otis Wardwell, representing the Massachusetts Electric Railway Association, opposed the bills in behalf of the electric roads in the towns of the State. He agreed with Mr. Cummings that the measures suggested were impracticable.

Springfield, Mass. E. K. Bodurtha of Agawam is interesting capital in the enterprise of building an electric line to Suffield. Some Hartford men of money have secured a charter for a road from Suffield to the State line just beyond Riverside grove, and he is anxious to raise money to run the road from that point to just the other side of the old toll bridge. The road would run through Agawam Center across the bridge over the Agawam river. Mr. Bodurtha represents that the line could be made a paying investment during the summer season at any rate, and would inevitably bring to Springfield a large amount of trade that now goes to Hartford by the steam cars. There are no very steep grades to overcome and fast time could be made in both directions. The distance between this city and Suffield is 10 miles, and to the State line is about 6 miles. In the summer season the road would be very convenient for pleasure-seekers to reach Riverside grove, and the company might find it a profitable investment to establish a pleasure resort of its own on the banks of the Connecticut river. The road might eventually be extended to Hartford.

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TRADE NOTES.

Granville S. A. Gardiner, vice-president of the Graham Equipment Company, has retired entirely from the ticket business in Providence, and will hereafter devote himself entirely to the sale of the Graham truck.

The R. A. Crawford Manufacturing Company, of Pittsburgh, Pa., has just issued a new catalogue, in which the several styles of the Crawford fenders, as well as the Crawford wheelguard, are described and illustrated. It is stated that over 2.800 Crawford fenders were sold in 1894, and that by their use 105 lives were saved in that year.

The Berlin Iron Bridge Company, of East Berlin, Conn., has lately completed an addition to the engine room of the Narragansett Electric Lighting Company, at Providence, R. I. The new plate girder bridge on Laurel street, at Hartford, Conn., is pronounced one of the finest pieces of work in the New England States. It consists of one span 155 feet long, with a roadway 36 feet wide in the clear, and two sidewalks each 8 feet wide in the clear. The roadbed is entirely of concrete on buckle plates, no wood work having been used. The bridge was designed and built by the Berlin Iron Bridge Company.

A Month's Sales of Jewell Belts.—The following belts were sold by the Jewell Belting Company, of Hartford, Conn., during the month ending Jan. 14. In the list, it will be noticed, is a 78-inch four-ply belt, 118 feet long. This, it is stated, will be the largest belt in the world. The list follows:

118 feet 78 inches four ply belt.
$105\frac{4}{12}$ feet 62 inches three ply belt.
$105\frac{4}{12}$ feet 62 inches three ply belt.
$88\frac{4}{12}$ feet 62 inches three ply belt.
$88\frac{4}{12}$ feet 62 inches three ply belt.
$88\frac{4}{12}$ feet 62 inches three ply belt.
110 feet 34 inches three ply belt.
117 feet 42 inches double belt.
67 feet 30 inches double belt.
115 feet 24 inches double belt.
58 feet 24 inches double belt.
92 feet 40 inches double belt.
99 feet 26 inches double belt.
90 feet 36 inches double belt.
113 feet 40 inches double belt.
136 feet 36 inches double belt.
130 feet 24 inches double belt.
86 feet 26 inches double belt.

RECORD OF STREET RAILWAY PATENTS.

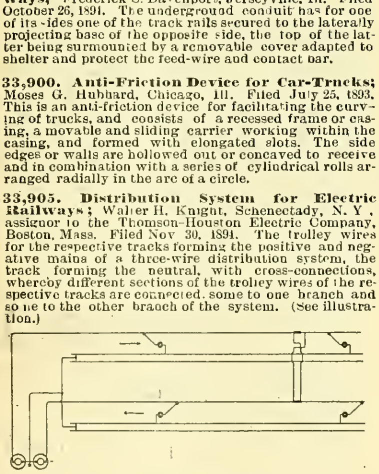
U. S. Patents Issued Feb. 12, 1895.

533,861. Electric Locomotive; Eben M. Boynton, West Newbury, Mass. Filed Apr. 9, 1894. A frame is fastened to the car body near one end of it, having guide wheels engaging with an upper guide rail. A driving wheel has removable web plates fastened to hubs revolving loose on a shaft situated in the frame and armature and field-magnet elements are situated between the web-plates; one element is fastened to the wheel tire and the other element to the shaft. Means for fastening the shaft to the motor-frame or allowing it to rotate and means for utilizing the rotations of the shaft for the operation of sundry appliances situated on the car, are provided.

533,869. Conduit System for Electric Railways; Frederick S. Davenport, Jerseyville, Ill. Filed October 26, 1894. The underground conduit has for one of its sides one of the track rails secured to the laterally projecting base of the opposite side, the top of the latter being surmounted by a removable cover adapted to shelter and protect the feed-wire and contact bar.

533,900. Anti-Friction Device for Car-Trucks; Moses G. Hubbard, Chicago, Ill. Filed July 25, 1893. This is an anti-friction device for facilitating the curving of trucks, and consists of a recessed frame or casing, a movable and sliding carrier working within the casing, and formed with elongated slots. The side edges or walls are hollowed out or concaved to receive and in combination with a series of cylindrical rolls arranged radially in the arc of a circle.

533,905. Distribution System for Electric Railways; Walter H. Knight, Schenectady, N. Y., assignor to the Thomson-Houston Electric Company, Boston, Mass. Filed Nov 30, 1894. The trolley wires for the respective tracks forming the positive and negative mains of a three-wire distribution system, the track forming the neutral, with cross-connections, whereby different sections of the trolley wires of the respective tracks are connected, some to one branch and some to the other branch of the system. (See illustration.)

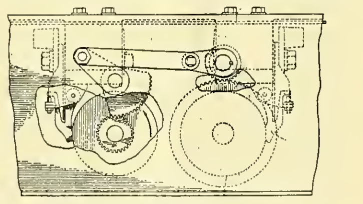


No. 533,905.

533,916. Car-Fender; Adolfo Pierra, Philadelphia, Pa. Filed Nov. 2, 1894. The fender is made of a heavy framework consisting of a triangular base which has converging beams extending therefrom, and a cross beam connecting two of the beams. The framework is covered with wire netting or other suitable resilient material. There are wheels at the three corners of the triangular base, two of which are adapted to rest upon and move along the track, and the third wheel adapted to traverse the path between the tracks. A rearwardly extending bar is secured to the crossbar of the frame of the fender, and is adapted to be inserted in and withdrawn from the draw head of the car, whereby the fender may be coupled and uncoupled with the car.

533,920. Series Parallel Controller; Edward D. Priest, Schenectady, N. Y., Assignor to the Thomson-Houston Electric Company, Boston, Mass. Filed Nov. 24, 1894. A commutating device or cylinder is adapted to couple the motors in series or parallel at will, and a reciprocating resistance cylinder is geared to the commutating cylinder, making a complete reciprocation for a definite arc of movement of the commutating cylinder. (See illustration).

533,961. Life-Saving Guard for Cars; Giovanni Mauro and Francesco Renzo, Paterson, N. J. Filed Nov. 5, 1894. The car has a cross bar secured to the front, and a guard is pivotally secured to the ends of the cross bar. A tubular rubber cushion is secured to the lower front edge of the guard, a disk plate being provided with a recess and a number of ratchet teeth securely fixed to the ends of the cross bar. A lever bar having two arms is made integral therewith, each arm being pivotally secured to one side of the guard frame and provided with lugs adapted to engage with the recesses and ratchet teeth in the respective disk plates. A spring connecting the lower end of each lever arm to a side of the guard frame is adapted to hold a lug on the lever arm in a recess of the disk plate and a netting extends from the lower front portion of the guard to the upper portion thereof, and is connected with the cross lever bar.



No. 533,920.

533,969. Car-Fender; Charles W. Stringham, Brooklyn, N. Y., assignor, by direct and mesne assignments, of five-sixths to George H. Thompson and John A. Williams, same place, and John H. Faulstich, Frederick Hausmann, and George Kraus, New York, N. Y. Filed Feb. 3, 1894. There are posts and rods provided with slots, the fender being provided with sleeves having projections and springs

534,060. Electric Controller; George F. Card, Covington Ky., assignor to the Card Electric Company, Mansfield, Ohio. Filed May 17, 1894. A series of pivoted arms carries contacts adapted to engage with the contacts of another series. A series of cams carried by a shaft is adapted to engage with the pivoted arms and impart an initial movement thereto. Springs are adapted to complete the movement in either direction and hold the contacts in or out of engagement.

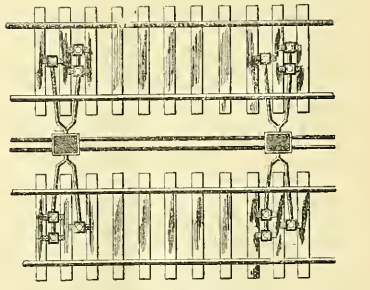
534,075. Tower Wagon or Vehicle; James R. McCardell, Charles H. West and Martin J. McDonald, Trenton, N. J. Filed June 6, 1894. The vehicle has an elevated stationary frame and a rising and falling frame movable vertically within and guided by said stationary frame with pulleys on opposite sides of the stationary frame at the top. A windlass mechanism is mounted on the body of the vehicle and flexible connections extends from opposite sides of the windlass roller up over the pulleys and are connected to the movable frame at or near the bottom. An oblong or rectangular platform is pivoted at one side of its center upon the top of the movable frame, and there is a circular track or rail on the movable frame. Rollers on the bottom of the platform are adapted to travel upon this track. A clamp is carried by the platform and overlaps the edge of the track rail, a handle for operating the clamp and thereby locking the platform in different positions of adjustment being provided. Rungs or steps upon the stationary frame constitute a ladder by means of which workmen may mount to the elevated platform.

534,078. Regulating Device for Car Motors or Other Electrical Apparatus; Horace F. Parshall, Schenectady, Assignor to the Edison General Electric Company, New York, N. Y. Filed Dec. 11, 1891. The combination, in a controlling device for electrical apparatus, of a rotatable, sectional shaft, a resistance conductor and contacts connected to different points therein, a switch arm movable over said contacts and connected to one section of the shaft, a body on the other section having switch contacts, co-operating contact brushes or devices, an automatically detachable connection between the sections of the shaft, whereby when one section is arrested the other section can continue to move, and a spring acting on the first-mentioned section in the direction to cause a snap break.

534,114. Fender for Street Cars; Gustave Lundberg and Charles H. Mattice, West Troy, N. Y. Filed Nov. 1, 1894. The fender for street cars is comprised of a rigid projecting base portion and side wings of resilient sheet metal, the lower edge of the side wings being attached to the rigid projecting portion, means being provided for connecting the same to a car.

534,218. Safety Attachment for Street Cars; Albert E. Hughes, Darien, Conn. Filed March 2, 1894. The combination of a car provided with a brake, a spring-actuated sliding screen normally held retracted and adapted when released to be projected forwardly, a trip device for holding the screen in retracted position and connections whereby the brake may be put on upon the forward movement of said screen.

534,238. Supply System for Electric Railways; Malone Wheless, Washington, D. C., assignor to the Electro-Magnetic Traction Company, same place. Filed Dec. 3, 1894. The system comprises a car provided with three contact shoes insulated from one another and from the body of the car. A source of electrical supply has its opposite poles connected to two of the shoes respectively, and a motor has one of its poles connected to one of the last-named shoes only, and its opposite pole connected to the third shoe. Track terminals in groups of three, one for each shoe, are set at such intervals apart that the contact shoes on the car will reach one group before they leave the other. There is an all-metal service circuit and a feeder from the supply side and a return wire from the return side of the service circuit connected to the two-track terminals of each group through which the motor circuit is completed. There are normally open contacts in each feeder and return connections an armature for closing both sets of contacts. A pick-up magnet for each armature has its energizing coil connected to the appropriate two of each group of track terminals, and circuit connections whereby when the car shoes meet a group of track terminals, the energizing circuit of the pick up magnet will be closed. (See illustration.)



No. 534,238.

534,245. Brake for Railway-Cars; James M. Smith, Valley Falls, R. I., assignor to himself and Andrew J. Currier, same place. Filed April 17, 1891. There is a friction clutch upon the axle and means connecting with the platform for effecting the engagement and disengagement of the friction clutch. A slotted bar serves to connect the loose member of the friction clutch with the lever.

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Rail Bonding and Electrolysis.

The communication of George P. Low, presented elsewhere in this issue, is a valuable and interesting addition to the discussion of those most important topics, rail bonding and electrolytic corrosion. These subjects, the author says, may best be considered jointly; for, in his opinion, "the problem of eliminating electrolytic corrosion is, in brief, simply one of judicious bonding."

Accidents at Grade Crossings.

Within the last few months several electric cars have become stalled on steam railroad tracks because of a failure of the power, and in one or two cases collisions with railroad trains have been narrowly averted. These incidents have caused a discussion in the daily press of "a new trolley danger," and have created a new argument for the abandonment of existing grade crossings, and inspired protests against permissions to construct new ones. The danger of accidents at railroad tracks should, of course, be removed if possible, but in a great many cases such an extreme measure as the abandonment of the grade crossing seems wholly unnecessary. A more practicable and less expensive plan would probably solve the problem. Where crossings are now protected it should be a comparatively easy matter to arrange a system, so that signals, operated automatically by the lowering or raising of gates, would notify engineers whether or not they might approach. They are not likely to pass signals set against them, for such disobedience, if detected, involves a loss of their positions. The adoption of some such system as this, which ought not to involve great expense, ought to reduce to a minimum the probability of accidents from collisions at such crossings as are now considered so dangerous that they are protected by gates.

The Heilmann Electric Locomotive.

In a paper on European electrical engineering presented elsewhere in this issue, H. Ward Leonard refers somewhat at length to the Heilmann electric locomotive which has been developed in France. This invention, which is no less than a compact plant on wheels for generating the electric current necessary for operating a train, has not, it is true, been regarded with any sort of favor by engineers generally; but at the same time we think Mr. Leonard goes too far in asserting that they have "derisively dismissed it from their minds as a ridiculous monstrosity of a crazy Frenchman." Mr. Leonard confidently believes that this combination will demand serious attention in the immediate future, and in his opinion this type of locomotive will be the link connecting the present steam locomotive and that operated from a distant central station. In a forcible way he presents the reasons that have caused him to entertain so favorable an opinion of the Heilmann locomotive, and it must be conceded that he makes its advantages far more apparent than have any of the French engineers whose indorsements have reached this country. Mr. Leonard is not the easiest expert in the world to convince, and he is not the man to be deceived by any inventor's claims of excellence for an impracticable or valueless machine. His opinion will go a considerable way toward inducing engineers on this side of the Atlantic to suspend judgment concerning the Heilmann combination until further experiments have demonstrated beyond all question its value or lack of value. It is interesting to note in this connection that the companies in this country that are considering the application of electricity to steam roads apparently attach absolutely no importance to the Heilmann experiments. Two or three of the most prominent railroad companies have determined to use electric power on certain of their shorter lines, but in adopting electricity they wish to make no experiments, or, at least, as few as possible. In all the projects of this kind that have been announced, the familiar overhead trolley system is to be adopted, and the construction will conform in all respects to the teachings of street railway practice.

Suggestions for Car Regulation.

Just at present Brooklyn is exceedingly prolific in suggestions for regulating and improving the operation of electric cars. Within the last four or five days no less than two reports have issued from bodies that have been considering suggestions for the control of electric railways. The recommendations proceeding from the advisory committee appointed some months ago by Mayor Schieren are more worthy of serious attention than those suggested by the aldermanic committee, especially as they embody the more essential features of the latter's report. The surprising feature of the report of the former committee lies in the absence of suggestions of an objectionable character. When committees study over the much-discussed question of trolley regulation in such exciting times as have recently been experienced in Brooklyn, the results of their deliberation are not likely to be worthy of serious consideration. In the report referred to, however, with one or two exceptions, the suggestions are worthy of attention. The recommendation that cars be equipped with some sort of a device to indicate audibly when the speed of a car exceeds that prescribed by law cannot be indorsed for more than one reason, the most obvious of which is that at the present time no reliable device of this kind is procurable. The suggestion that cars shall not carry passsengers in excess of 50 per cent. of the seating capacity is not a good one, for the reasons which were outlined by Mr. D. F. Lewis, of the Brooklyn Heights road, when his attention was called to it. He says: "This is something not possible for street railroad companies to do and carry passengers for five cents fare. It would result in bankruptcy and be practically a confiscation of all street railroad property. If we could be guaranteed more passengers in the hours when travel is light, the matter of getting more cars might be considered. But it is apt to be forgotten that the rush hour cars are filled only in one direction and that they run back almost empty." With the exceptions noted, the report which appears elsewhere in this issue is worthy of commendation, and some of its suggestions, like, for instance, that relating to the obstruction of cars, are admirable.

It is a satisfaction to note that the necessity of preventing car obstruction by obstreperous teamsters is already forcing itself upon the attention of the public authorities of Brooklyn. In that city, as in most other cities, there are on the ordinance book regulations providing penalties for the unnecessary blockading of cars, but, as in most other places, they have been almost a dead letter up to the present time. It is to be hoped that this suggestion of the committee will receive earnest attention.

SUGGESTIONS FOR STREET RAILWAY REGULATION IN BROOKLYN.

In December last Mayor Schieren, of Brooklyn, appointed a committee to suggest means for the betterment of the local street railway service. The report of the committee addressed to the Mayor is as follows:

In compliance with the request contained in your esteemed communication of Dec. 29, 1894, in which you asked the undersigned to act as an advisory committee to investigate "the question of the speed of the trolley cars and a fender, or system of fenders, for them, and in general the proper regulating of the trolley systems of this city," your committee has held a number of meetings, at which there have been present the officials of all the trolley roads, as well as representative motormen and conductors, and an opportunity has also been given the public to be heard. After careful consideration of the information thus gained, together with considerable personal investigation of the practical details of the trolley system, we beg to submit the following recommendations for the regulating of the trolley system which we believe will afford the best service to the public at the least risk to life:

1. The speed of trolley cars should not exceed 10 miles an hour.

2. Every car should be provided with a device giving an audible signal when the speed of the car exceeds ten miles an hour.

3. Passengers should not be allowed to ride on the front platforms, and both gates of the front platforms should be kept closed when the cars are in motion.

4. The gates on the track side of the rear platforms should be kept closed.

5. Cars on all lines crossing main thoroughfares on which there are car tracks should come to a full stop before crossing. Cars on main thoroughfares must be kept under perfect control and run at a reduced speed at such crossings.

6. All cars should be provided with reliable fenders, which should be approved by a commission of experts.

7. In case of an accident occurring through the negligence of a motorman the motorman should be held criminally responsible therefor.

8. It being the opinion of this committee that accidents have occurred which have been due to the use of intoxicants by employees, we earnestly recommend that the companies provide at their respective depots comfortable waiting rooms for the men, where tea and coffee may be obtained at reasonable cost.

9. The tracks should be kept sufficiently sanded where needed.

10. As cars are often wilfully and unnecessarily obstructed by traffic wagons, we advise that the law that makes it a misdemeanor wilfully to obstruct, hinder or delay, the passage of any car running on a street railway be rigidly enforced.

11. We consider that the present overcrowding of the cars is indecent and a fruitful source of inconvenience, delay and danger, and we therefore strongly recommend that the number of passengers carried on any car should not exceed its seating capacity by more than 50 per cent. We are aware that the enforcement of this rule will necessitate an increase in the number of cars, but we consider that the public is entitled to proper and decent accommodation.

The following report on the local trolley system has been made by a committee of the Brooklyn Board of Aldermen. Action has been deferred on the recommendations:

The special committee appointed under a resolution adopted by this board Jan. 7, 1895, to investigate the methods of running city passenger railways, have held several public meetings, at which citizens and the representatives of the several companies operating railroads on the streets of this city were invited to be present.

Many statements were made and various suggestions were offered regarding different appliances for the protection of life, rate of speed, licensing motormen, etc.

Your committee are of the opinion that fenders now used by the several trolley roads are not well adapted for the purpose intended, and that the several companies should forthwith adopt others which would afford better protection to life. But at present this committee is not prepared to recommend those of any special design. Your committee find that the steam roads, both surface and elevated, are run with care and to the satisfaction of the general public; that loss of life and accidents are infrequent and the management of said companies to be commended. Your committee have not had time to consider and investigate various other suggestions which have been brought to their notice, and would ask for further time for the consideration of these questions, but make this report as a report of progress, and recommend for adoption the following:

This common council does declare and ordain that any individual company or corporation using the streets of Brooklyn and running thereon cars propelled by steam, electricity or horse power for passenger traffic shall obtain a license, which license, with the number thereof, shall be displayed conspicuously in each car, and said license shall not be transferred from one car to another, under a penalty of $25 for each violation of this ordinance.

This common council does declare and ordain that any individual company or corporation running cars upon the streets of Brooklyn shall, on or before 12 o'clock, noon, of each day, report to the commissioner of police, in writing, all casualties or accidents, and the nature thereof, occurring upon the road under its management, whereby any person has suffered or sustained injury during the day of 24 hours preceding the day of report. The penalty for each violation of this ordinance shall be $25.

This common council does declare and ordain that the rate of speed of all cars propelled by electricity shall not exceed eight miles per hour; that is, no car shall run over any part of its route at a speed greater than 704 feet per minute, and for the better observance of this ordinance this common council does declare that each car propelled by electricity shall have placed therein a speed indicator, visible to passengers, and shall be so adjusted as to correctly indicate the speed when said car shall be in motion. The penalty for each violation of this ordinance shall be $25.

This common council does declare and ordain that no person except an employee and motorman shall be permitted to ride on or have access to the front platform of any car propelled by electricity: the front platform shall be closed, so as to prevent anyone from entering thereon or alighting therefrom. The penalty for each violation of this ordinance shall be $25.

This common council does declare and ordain that all cars propelled by electricity shall come to a full stop before crossing a trolley or other railroad, and for the purpose of taking on or letting off passengers each car shall come to a full stop before crossing the intersecting street. The penalty for each violation of this ordinance shall be $25.

DEATH OF GREENE PACK.

Greene Pack, president of the Detroit Railway Company, died in New York last Sunday. He had been suffering from Bright's disease of the kidneys for a long time, but while he was feeling unwell when he left Detroit, six weeks ago, his condition was not considered serious. Mr. Pack first became interested in street railways in Cleveland. His investment there was successful, and at the suggestion of Henry A. Everett, of that city, Mr. Pack and his brother invested largely in the Toronto railway system. Recently these gentlemen decided to introduce a new system of railway in Detroit, and a franchise was secured a few weeks ago.

REWARDS FOR EMPLOYEES.

Occasional distribution of stated sums in cash among employees for commendatory work in the discharge of their duties, it is claimed by the officials of the Southern Electric Railway Company, has an excellent effect on the men and is of great benefit to the road and its patrons, according to a writer in the St. Louis *Globe-Democrat*. So well satisfied are the officials that more prizes will be given this year than ever before. J. C. Allen, the superintendent, in speaking on the subject, said: "In years gone by we were considerably troubled with untidy cars, and no matter how peremptory the orders to keep the cars well swept, the windows clean and the seats dusted, still the cars were not as presentable as we desired. About two years ago we offered prizes for the best kept cars. We divided $100 every three months among the men, who made a record for clean cars. Every one contended for the prize since the extra work involved was insignificant. What is the result? Our cars are as clean as they can be kept under the circumstances. Those prizes are still distributed. We now have added twice as many more. To the motorman who is fortunate enough to steer clear of all accidents between January 1 and July 1, $25 in cash; to the second, $15; third, $10. To the conductor who writes the best account of an accident, $25; second best report, $15; third best, $10. I can say that all the prizes will be competed for, and, accidents or no accidents, they will be distributed. If all the motormen have accidents charged up to them during that period, those having the fewest will get the prizes. We have found that when men are striving for something they discharge their duties more faithfully."

ECHOES OF THE BROOKLYN STRIKE.

There is no longer even a nominal street railway strike in Brooklyn. A few days ago the strike of the employees of the Atlantic Avenue Railroad Company was declared ended; the ban was removed last week from all other lines. While the strike has been abandoned, the new employees of the Atlantic Avenue Company have not been allowed to work undisturbed. Few of the old men have succeeded in obtaining work and to the ill-feeling that has resulted from this state of affairs is attributed the frequency of assaults on the new conductors and motormen. President Norton, of the Atlantic Avenue Company, has had no doubt regarding the persons who have committed these outrages, and he has adopted a novel plan to stop them which is explained in the following notice posted on the several car-houses:

A few of the former employees who went on strike have been given employment on the road again under special conditions. They will be given such positions as may be left, the new men taking precedence.

In case any new men are threatened, abused, or intimidated by any such old men, they will please promptly report it to the superintendent, because every single offence of the kind mentioned will be followed immediately by the discharge of five old men, the names to be drawn by lot.

All the new men on this road will be protected, and they may rest assured it is the intention of the management to have the business of the company conducted harmoniously, and that none of the former employees who have been taken back shall in any way interfere with their comfort or happiness.

INVESTIGATION OF THE STRIKE.

The Legislative Committee appointed to investigate the strike resumed its labors last Tuesday. Ex-Conductor West, a prominent member of the Knights of Labor, testified that the locals voted to sustain the Executive Committee of District Assembly No. 75 in whatever it did, whether it decided to compromise or strike. He concluded that the men expected a settlement. In his opinion, there was only one real point of difference between company and employees, and that concerned the employment of trippers. Mr. West thought that the companies were disinclined to come to terms with their men because they had determined to strike a blow at organized labor.

President Norton of the Atlantic Avenue Railway Company was the next witness. He said that the question of trippers was the one that caused the trouble. The company, by its stand, reserved the right to control the running of its cars. He was asked if his notice, given above, that, for every new man assaulted or intimidated, five of the old men lately reinstated in the company's employ should be discharged, was an act of peace or war. He said it was a peace measure most decided as he continued: "We have been compelled to do this to protect our new men. We found that for obvious reasons there was a disposition to conceal the identity of these intimidators, so we decided to inflict punishment in the only way possible."

Agreements, Mr. Norton said, in the course of his examination, were likely to cause strikes. When the men dealt with the company through committees there were always misunderstandings. This was not true of an order like the Brotherhood of Railroad Engineers, the members of which are all of a high order of intelligence.

He said he was inclined to believe compulsory arbitration would not prove effective.

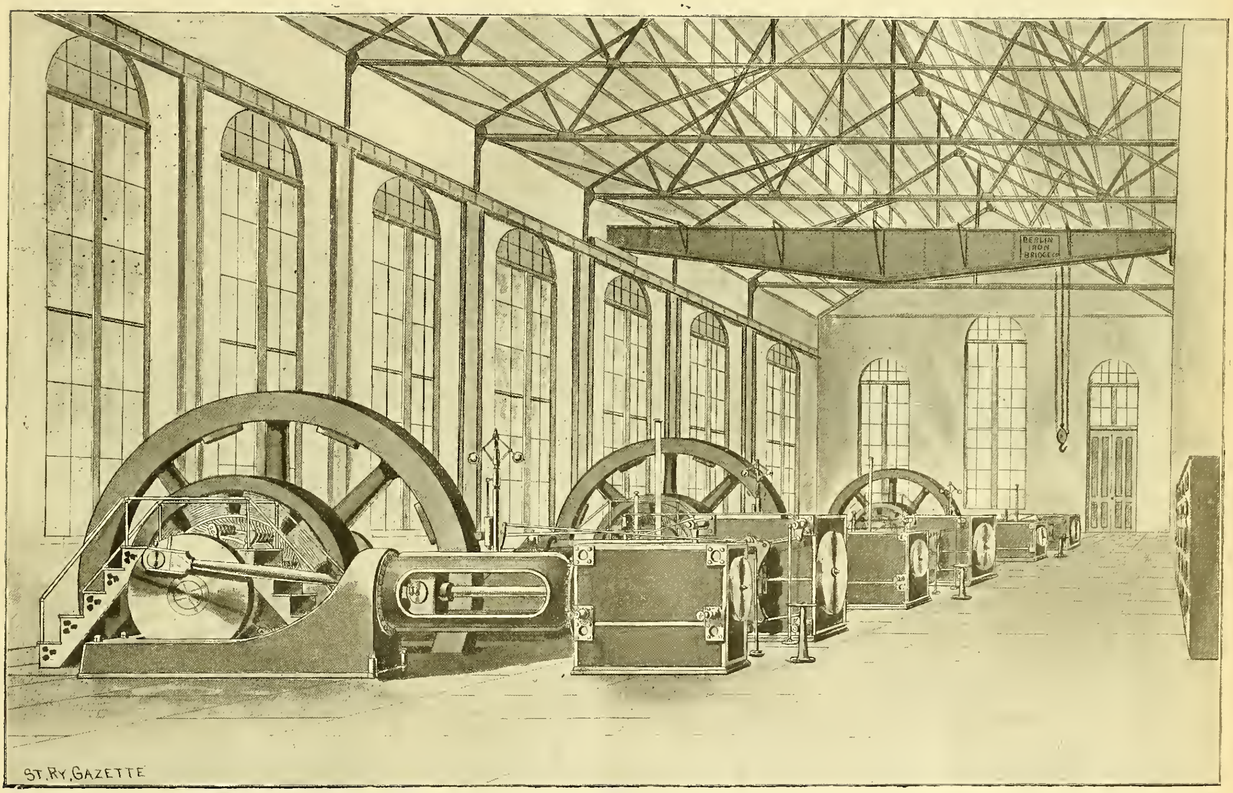
Several other witnesses testified, but nothing of great importance was developed.

St. Louis, Mo.—A bill has been introduced in the City Council authorizing the Jefferson Avenue Railway Company to change its motive power to electricity. It provides that the road shall run from Geyer Avenue to the Fair Grounds. The consideration named is the payment of $1,000 from Jan. 1, 1897, to the year 1900; $2,000 a year to 1915; $3,000 a year to 1925 and $4,000 a year until 1932.

POWER STATION OF THE NASSAU ELECTRIC RAILWAY COMPANY, BROOKLYN.

The installation of the engines and generators in the power station of the Nassau Electric Railway Company, of Brooklyn, N. Y., is progressing rapidly. One engine with its generator is already in place and the parts of two others have been received and will be on the foundations in a short time. As stated in the STREET RAILWAY GAZETTE of Feb. 9, in which appeared a description of the company's plans, the power equipment will at first consist of three cross compound condensing Cooper Corliss engines of 750 horse-power, each direct connected to Westinghouse multipolar generator. Provision has been made for increasing the equipment to fire-engines and generators. A view of the interior of the power station is given in the accompanying illustration.

The engines were especially designed by C. & G. Cooper & Co., of Mount Vernon, for street railway work. The cylinder dimensions are 22 and 40 inches in diameter with 48-inch stroke, and the engines will be run at a speed of 90 revolutions per minute. As will be seen in the illustration, the engine room is unusually light and attractive. The building is of well-known type of the Berlin Iron Bridge Company's standard steel construction. The corrugated anti-condensation roof is supported on steel trusses which in turn rest on steel columns. The side walls are of brick. The room is thoroughly lighted on three sides by large windows, and additional light and ventilation are furnished by windows in the monitor roof extending the entire length of the building. The interior walls will be furnished in light color, which will greatly add to the light and attractive appearance of the room.



POWER STATION OF THE NASSAU RAILWAY COMPANY, BROOKLYN.

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Atlanta, Ga.—The Atlanta Electric Railway Company has asked for a franchise to build and operate an electric railroad on certain streets. Mr. Dayton Hale is president of the company.

APPEAL TO ARBITRATION BOARD IN NEW ORLEANS.

The Street Railway Employees' Union, of New Orleans, has called upon the Louisiana Board of Arbitration to adjust the controversy existing between it and the several railway companies. Recently the union sent to the companies a form of agreement providing, among other things, that the men be paid $60 per month and that 10 hours constitute a day's work. At the present time the monthly wages are $50, and the men work 12 hours daily. The presidents of the companies, at a joint meeting, decided to refuse to accede to the demands, and determined not to recognize the union. The following formal reply was sent to the leaders:

"This company has carefully considered your demand that it sign the memorandum of agreement presented through your committee on Feb. 14, and thereafter contract with your body and cease to contract with its employees as individuals.

"In answer, we beg leave to say that to accede to your demands would be to practically surrender the management and control of this property to another organization, or, at least, to take another organization into partnership in the management of this corporation, and this we cannot accede to, and, therefore, decline to treat with you. If our employees have grievances and will present them to us we will always give their complaint respectful consideration and an early answer."

It was rumored that the men would strike during the Mardi Gras festivities and thus subject the public to the greatest inconvenience, but instead of striking the union voted to appeal to the State Board of Arbitration. In the petition addressed to that board the employees refer as follows to their demands:

The Street Railway Employees' Union some days ago submitted a proposition or contract to the different street railway companies in the city for the purpose of trying to relieve us of some of the hardships to which we are now subjected. We are sorry to say that the corporations above referred to have construed our purpose in presenting them with the agreement in a different spirit from which it was intended. We never did, nor do we wish now, to manage or become partners in their business. All that we ask is that we be granted the same right as they claim for themselves—that we be represented and treated with through our authorized officers.

Our object in this is simply that at any time that we wish to make any agreements or contemplate any changes, that we send our representatives to meet the representatives of the companies, and consult and agree on a settlement. In consideration of the fact that we have tried to settle our differences and find it impossible, and in order to prevent any trouble or inconvenience to the public, we herewith inclose you a copy of our contract, asking that your board be called together and consider the same. We also promise and agree to abide by your decision, and also to continue on in our positions until the time required by law.

It is expected that the board will hand down a decision next week.

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OBSTRUCTING CARS IN BROOKLYN.

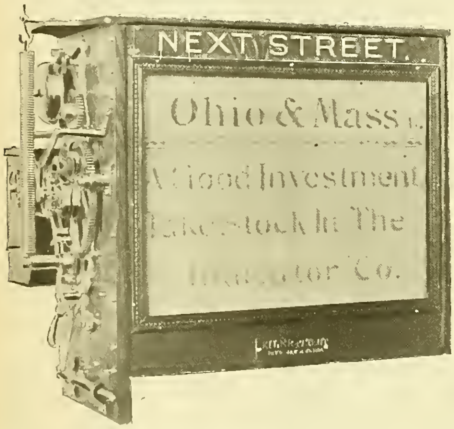
Since the strike was declared in Brooklyn a great many teamsters have made it a practice to show their sympathy for the old employees by interfering with the progress of cars. The obstructions of cars in this way have become a great nuisance, so that the Police Department found it necessary to issue the following notice to the captains:

Your attention is called to the strict enforcement of Chapter 11, Article 5, Section 10 (on page 77), of the City Ordinances: Chapter 11, Article 5, Section 10—"The cars shall have the right to the tracks as against any person, carriage, vehicle or incumbrance put, driven or being thereon with a view to delay or embarrass the progress of the cars; and no person shall obstruct or prevent the cars from running or progressing thereon, or remain or keep any vehicle on said tracks on the way of any car, if there shall be an opportunity to turn off." The obstruction of trolley cars by carts or other vehicles remaining upon the tracks after being warned to leave is an infringement of the ordinance and is a misdemeanor, it being an obstruction to public travel.

You will therefore notify all the members of your command that such offence must be noticed by them and prompt arrests made of guilty persons.

STREET INDICATOR FOR STREET CARS.

The street and station indicator which is shown in the accompanying illustration has, it is claimed, many advantages over devices heretofore designed for this purpose. The utility of such a device on a street car is unquestioned, and it will be especially appreciated during the winter months by passengers, for by its use, the necessity of opening the rear door for the announcement by the conductor of the name of a street will be obviated. As the cut shows, the appearance of the indicator is neat, and when it is located over the front door or at the side of the car, it cannot be regarded as objectionable in any way. In this device, the names of the streets or stations appear on a continuous roll, which is moved behind glass. The roll has a capacity for the names of streets sufficient for a car run of from 12 to 15 miles. In indicators that have heretofore been used the objection has been made that the motorman or conductor whose duty it is to operate it sometimes make a mistake, and the device, for some little time, therefore, is likely to give incorrect information. This is guarded against in the present indicator, by arranging a repeater in plain view of either the motorman or conductor who has charge of it. This shows on a small scale the name or station which appears on the face of the indicator. If a mistake is made it can be instantly corrected, though error is extremely unlikely, and could only result from gross carelessness. The mechanism for operating the indicator is simple, but strong and positive. The announcement on the face is changed by the pressure of the foot on a lever on the platform, but if considered desirable it may be constructed to operate automatically. At each change a small bell is struck calling the passengers' attention to the fact. One strong feature of the indicator consists in the fact that the continuous roll may be reversed by the simple turning of a switch so that at the end of a trip no time or trouble is necessary in making it ready for use on the return. George J. Marott, of the National Street & Indicator Company of Indianapolis, was in New York a few days ago and submitted it to the inspection of street railway men. They were inclined to regard it with no little favor. Mr. Marott proposes to interest in the company persons who will take an interest in the introduction of the indicator on lines in various cities in the country. It is the invention of Charles M. Keiler, of Indianapolis.



STREET AND STATION INDICATOR.

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Norwalk, Conn.—The Norwalk Tramway Company has raised a novel defence in the suit brought by Mrs. Horton for damages resulting from a collision accident. It asks that the judgment be set aside on the ground that, as Mrs. Horton was riding on Sunday, for pleasure, in violation of law, she has no grounds upon which to base a suit in damages, and must accept the consequences of her unlawful act.

NOTES ON RECENT ELECTRICAL ENGINEERING DEVELOPMENTS IN FRANCE AND ENGLAND.*

BY H. WARD LEONARD.

As a result of inspecting some of the most interesting of the developments in the field of electrical engineering during a recent trip to France and England, and as a result also of having met many of the engineers responsible for these recent developments, I find it difficult to reach a conclusion as to whether we or our contemporaries across the water are ahead in the electrical engineering race.

Of course, when one attempts to compare the electric developments of the respective countries commercially, we are in the same position as the "America" was in the historic yacht race, "there is no second"; but considering the recent electrical development from an engineering standpoint we are rapidly losing the lead we have thus far held.

Although I have always felt that so-called fundamental patents and the resulting enormous aggregations of capital and engineering talent under one management were a millstone around the neck of our profession, I have never before had the opportunity of seeing positive and unmistakable evidence of it such as this visit abroad showed me.

In the beginning of electric lighting, both arc and incandescent, we led the world from an engineering standpoint and were years ahead of any other country. But what has been done in this country in the way of a remarkable electrical engineering development since Edison started his first three-wire system at Sunbury, Pa., July, 1883, and Westinghouse established his alternating system with 1,000 volt primary and 50 volt secondary a few years later, and Sprague started the Richmond electric road? A moment's thought will, I think, make you all realize that the practical development of electrical engineering improvements is almost impossible against the opposition of the gigantic corporations in that field, and that corporations having such a large portion of their capital represented by patents will not wish to see the practical trial of a promising improvement which they do not control, and which may depreciate the value of the methods they control or claim to control. It is in just this way that we are losing ground when compared with England and France. We undoubtedly have the best three-wire central station plants in the world, also the best alternating system converting from 1,000 to 50 volts. But what other kind of central stations have we to point to? Practically none.

We have 500-volt continuous current electric railways galore, and we operate such railways at distances for which 2,000 volts should be used instead of 500; and after investing more money in copper per car than the entire cost of the electrical equipment, we still lose twice as much energy as is commercial in the line.

Is there a large elsctric railway system in this country which, as an electrical transmission of power, is a credit to our profession? Not one.

In France, and even more in England, one is forcibly impressed by the many kinds of central stations being tried. Many of them may seem almost sure to prove commercially unsuccessful, but who can say which one may not prove the "Sunbury" of an enormous electrical engineering development?

No capital or patents can prevent the slow development of evolution, but I fear that under the existing conditions we shall have to content ourselves with drawing pictures of what might be done, and watch the continued introduction of the three-wire system of 1883, the 1,000 to 50-volt alternating system of about 1887 and the continuous current 500 volt railway system of 1887, while our engineering friends abroad keep trying not only their own ideas, but the ideas of many of us from this side because they have the necessary encouragement and opportunity to do so, while we have not.

I have learned, on this hurried trip abroad, of many applications of inventions of American engineers which have proven very successful, and which, although patented, described and advertised in this country, were taken up first by English or French engineers, notwithstanding their well-known prejudice against American inventions.

MANUFACTURING AND ENGINEERING.

In England there is a multitude of medium size concerns, manufacturing electrical apparatus, and the competition is mainly on ideas, and not the cost of dynamos per kilowatt. It is surprising to find that generators and motors are much cheaper in the United States than in either England or France, notwithstanding their advantages over us as to cheaper raw materials and labor.

The manufacturers abroad generally consider the consulting electrical engineers as entirely unnecessary, in view of the multiplicity of schemes which every plant brings forth from the various manufacturers, but I believe that a great deal of benefit has been and is being accomplished in England, by virtue of the custom of placing in the hands of good consulting electrical engineers the design, for instance, of a large central station plant to be built by a city itself.

Has a central station of this kind ever been built in this country? I think not: that is, a central station built according to advice from a good consulting engineer who was free to select the good features and eliminate the bad features of the various systems known to the art. Imagine a central station combining apparatus and methods of the General Electric, Westinghouse, and Siemens & Halske all in one system, also taking advantage of other good ideas from the United States and abroad. Who can doubt that it would be better than could be built by using only the patents and apparatus controlled by some one company?

Many will answer that all the best engineers are in the employ of the leading companies and the consulting engineers available are incompetent commercially, and there is a great deal of force in this argument; but even if true, it certainly merely emphasizes the difficulty of getting a practical trial in this country of pomising ideas in the electrical field unless they be controlled by one of the would-be monopolists.

STEAM ENGINES.

I believe we are ahead of England and France in the designing of dynamos and engines. Their workmanship leaves nothing to be desired, but giving consideration to amount of material used, efficiency and design, I think we are in advance of them.

One of the most surprising things to me was to see the almost universal use of engines which we would consider had practically no governor. That is, engines using slow-acting throttling governors instead of the triumphs of engineering skill which are so common in this country. Not since 1883 have I seen such poor governors as I found generally used abroad in the finest and most recent stations, and upon engines which are almost perfection itself as regards manufacture.

THE PARSONS STEAM TURBINE.

The Parsons steam turbine was one of the most interesting things I saw in England. These steam turbines are direct coupled to dynamos, and in sizes of 350 K. W. revolved at 3,000 revolutions per minute, and of course run at higher speed in smaller sizes. The space occupied by a 350 K. W. outfit is over all about 25 feet long, 5 feet wide and, including governor, about 7 feet high. These turbine plants, when running at these high speeds, are entirely free from vibration, and are not even bolted down, but are supported by three pedestals, one near each end and one at the middle. There are some seven or eight bearings all in line, and a continuous stream of oil is forced through the bearings by a small pump driven by a worm on the main shaft.

The bearings used are extremely simple and very ingenious. The shaft runs in a gun-metal sleeve of about the usual dimensions, but between this sleeve and the surface of the pillow block are three cylinders of thin sheet brass concentric with the shaft, and sliding loosely over the gun-metal sleeve. The gun-metal sleeve is prevented from turning by a lug projecting down at one end into a hole in the pillow-block. The entire box being filled with oil, it will be seen that the shaft is free to vibrate slightly in every direction as it revolves, and that the viscosity of the oil tends to damp any such vibration. The three thin surrounding sleeves are perforated by a hole of about one-eighth inch at about every two inches, so that the oil can work freely between these sleeves. The Parsons steam turbine uses the steam expansively, as a reciprocating engine does. The steam at about 125 lbs., and preferably superheated, is led into the center of a cylindrical chamber, in which the moving parts revolve. There are three of these chambers. In the first chamber the steam is expanded down partially, and thence goes to a second similar chamber, and finally to a third one, which last chamber leads to the condenser. In each of these chambers the steam in its passage from the admission to the exhaust has to pass some thousands of small blades or teeth which project from the surface of the disks a fraction of an inch. The amount of steam used and its expansion will depend upon the clearance and the number of these turbine disks it has to pass in getting to its exhaust. It will be evident that the friction of the engine is less than that of a reciprocating engine, and that the condensation losses should be less. Also full advantage can be taken of high pressure and especially of superheated steam, for the difficulties of proper lubrication and packing in the presence of high temperature steam in a reciprocating engine do not apply to this engine.

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* Extracts from a paper presented at the meeting of the American Institute of Electrical Engineers, New York, Feb. 27, 1895.

Tests by Professors Ewing and Kennedy indicate that this turbine, when in perfect condition, has an efficiency of 1 K. W. hour in electrical energy produced by 28 pounds of feed water, the turbine being operated condensing. This is equivalent to about 15.7 pounds of water per indicated horse-power per hour, and I understood that in a recent competition a guarantee was made by Mr. Parsons which was equivalent to about 13 pounds per indicated horse-power per hour, and that his guarantee was lower than that of the best triple compound condensing engines of the reciprocating type which were in the competition. At Newcastle-on-Tyne I saw a central station of about 25,000 lights operated solely by these steam turbines, and which has been in operation since 1890 and has been earning and declaring dividends ever since it started. An interesting fact as to this Newcastle station is that all of the conductors are laid underground and consist of vulcanized rubber cables drawn into cast-iron pipes which are gas and water tight, and through which chemically dried air is forced from the station by a blower.

There are over six miles of piping and over 25 miles of cable, and after five years' operation Mr. Parsons states that they have not had a single instance of failure of insulation, explosion or other trouble with the underground system.

THE LAVAL STEAM TURBINE.

Before leaving the subject of steam turbines, I will describe the Laval Steam Turbine, of which I saw a number in the works of the manufacturers, Breguet & Co. of Paris. This steam turbine differs radically from the Parsons. The power is derived from the momentum of a jet of steam impinging upon buckets near the periphery of a disk, so that the machine is somewhat comparable to the Pelton water wheel. The steam, which is preferably used at a high pressure, and exhausting into a vacuum, is expanded in a nozzle before reaching the disk, and reaches the buckets of the the disk fully expanded, and hence, moving at a very high velocity, which the inventor claims is 3,000 feet per second for steam at 85 pounds per square inch, exhausting into the air, and 3,700 feet exhausting into vacuum. The nozzle makes a very slight angle with the plane of the disk. The admission of steam is controlled by a centrifugal throttling governor. The number of revolutions of the disk per minute varies from about 30,000 to 15,000 in sizes from 5 to 50-H. P. The buckets are milled out of a solid disk of steel, just inside of the periphery, so as to leave a solid band on the circumference. The edges of the buckets are quite sharp. The disk in a case of a 50 H. P. turbine is about $\frac{1}{2}$-inch thick. This disk is mounted on a small steel flexible shaft at a point about $\frac{1}{3}$ from one end At the high speeds in question, a body tends to revolve about an axis through the center of gravity; and since it is impracticable to make the center of gravity absolutely coincident with a straight line joining the bearings, Mr. Laval has used a flexible shaft so that the disk is free to assume such a position as to revolve practically around an axis through the center of gravity, and, consequently, the disk revolves with perfect smoothness and without any trouble at the bearings at these enormous speeds.

HEILMANN LOCOMOTIVE.

No successful way has been perfected as yet for operating a dynamo directly at these speeds, and so Mr. Laval gears from his turbine shaft to two dynamo shafts, one on each side of the turbine shaft, by means of double helical gears beautifully cut, which reduce 10 to 1, and upon these two driven shafts are placed the dynamo armatures, two driven shafts being used so as to balance the side thrust on the bearing of the turbine shaft. The Laval people claim as high efficiency as that of any steam engine of the same horse-power, and there seems no good reason to doubt their ability to secure such an efficiency which they guarantee fully and specifically.

A careful test made at Stockholm in 1893 showed an efficiency of 20 pounds of water per horse-power hour with steam at 113 pounds initial pressure and used condensing. The weight of this turbine is about 30 pounds per horse-power in a size of about 30-H. P.

The simplicity of this steam engine, also its theory and practical design in detail are most beautiful, and it seems likely to become an important factor in the electrical field. What is needed is a generator of electricity directly driven by, or preferably constituting a part of, the revolving disk, and here is food for considerable thought.

LIVERPOOL ELECTRIC RAILWAY.

At Liverpool I investigated the overhead electric railway. The overhead structure, the motors, methods of collecting the current, etc., were exceedingly well designed and constructed and gave evidence of good working The central station apparatus and design was not, however, up to the standard of work here in recent electric railways.

The series parallel control is used, but no rheostat, the designer seeming to realize that it might just as well be left out, and the equivalent resistance secured in the windings of the motors themselves, with less apparatus and no appreciable difference in economy or control.

THE HEILMANN LOCOMOTIVE.

In France I examined what I considered the most important electrical engineering development of all that I saw. It was the Heilmann electric locomotive. Having been for some years past a firm believer in the merit of this machine, and having been in correspondence with Mr. Brown, Mr. Heilmann's electrical engineer, as to an invention of mine used in this locomotive for the first time on a large scale, I was especially interested in it, and my hearers will please discount as they may think necessary my description of the advantages of a locomotive using my system of control.

The locomotive I saw was the first one built, and was not in service when I was there. It had run 2.200 miles commercially, however, and as a result of the performance of this first locomotive, which was 600 H. P., there are now building two locomotives of 1.500 H. P. each, which, it is expected, will go into commercial service about June next.

This electric locomotive carries its own central station with it. It is really a complete central station on wheels, with its power used for propelling itself. Speaking from memory, I should say the length over all was about 50 feet. The locomotive is mounted upon two bogies each having four axles, so that the weight of the locomotive is borne by 16 wheels, each of which is about 45 inches in diameter. A platform made of heavy iron girders runs the whole length of the locomotive, and is supported upon two pivots, one at the center of each bogie. Upon this platform is mounted the coal, water, boiler, engine, dynamo, etc., so that it will be noticed every pound of material is used upon the drivers and therefore becomes effective for tractive purposes.

The entire weight of the locomotive is 114 long tons; that is, about 15,500 pounds per driving wheel, which is about the same as our standard practice in this country. With a tractive coefficient of .2 this means a draw-bar pull of 50,000 pounds and assuming friction at six pounds per ton, we find that 50,000 draw-bar pull would enable us to pull 1,900 tons on a one per cent. grade at a low speed, say 15 miles per hour, and would give us ample draw-bar pull for handling a 200-ton train at any speed thus far seriously discussed.

Most engineers who have heard of the Heilmann locomotive have derisively dismissed it from their their minds as a ridiculous monstrosity of a crazy Frenchman, but I have for sometime believed, and am now convinced, that you will in the immediate future be bound to give this machine the most respectful consideration. I find that the impression prevails generally that the modern steam locomotive is really a very perfect and efficient machine. This, I think, is far from being true. The efficiency of a boiler depends largely upon how perfect the combustion is, and with forced draft we can realize an efficiency of 80 per cent. with very perfectly designed boilers, provided we do not attempt to burn more than about 40 pounds of coal per square foot of grate surface per hour. But the maximum duty of boilers in locomotive practice, such as for the highest speed service, involves the use of nearly 200 pounds of coal per square foot of grate surface, and I need hardly say that forcing the boiler in this way results in a terrible inefficiency. To produce an indicated horse-power in a steam locomotive at highest speeds to day probably requires at least twice as much coal as is required in first-class stationary or marine boilers. This is the first place where Mr. Heilmann is able to show an economy; he is able to carry a larger boiler, and hence does not have to crowd it to such a wasteful point.

But regardless of an abundant supply of steam from the boiler we find ourselves greatly limited in power for steam locomotive practice at high speed, because of the wire-drawing of the steam, and difficulty of properly exhausting when we run ou locomotive at its highest speed. The maximum draw-bar pull obtainable, when running at the highest speed, is only about half that obtainable at slow speed, no matter how much steam we have at command or at what cut-off we work. Heilmann avoids this difficulty, as we shall see presently.

Another matter of most serious importance is the tremendously destructive effect upon the roadbed, and upon the locomotive itself, of the unbalanced vertical component of the motion of the counter-balance weight of the steam locomotive, and also the shouldering effect of the locomotive tending to spread the rails. Probably at least one-third of the cost of maintenance of the roadbed and the locomotive for high-speed service could be traced directly to this destructive "hammer blow" and side thrust. Both of these effects, which become very troublesome as we go to the higher speeds, are entirely absent in the electric locomotive.

Having now pointed out the weaknesses of the steam locomotive, which develop most forcibly as we increase in speed, I will describe the construction of the Heilmann locomotive and point out how those difficulties are obviated by the electric locomotive.

The steam engine is compound, well balanced, and directly coupled on its shaft is the electric generator A four-pole single reduction motor of the iron-clad type is geared to each of the eight axles, and the motors, which are series wound, are multiple with each other across the brushes of the generator armature. As the motor field must have a fair degree of saturation to prevent sparking when the locomotive is running light and pulling no train, it will be evident that under all operating conditions the motor fields are constant and fully saturated, which makes them entirely sparkless. The field of the generator is separately excited by means of a small auxiliary engine and constant potential dynamo, which also supplies the electric lights needed. The engine has a fixed cut-off at the most economical point, say one-quarter stroke, and its speed is adjusted by the throttle.

The engine in practice is varied in speed from perhaps 50 to 500 revolutions, and the strength of the generator field from zero to its maximum strength. It will be noticed that all steam used is used expansively at a fixed cut-off, and Mr. Heilmann lays great stress on this, although I myself would prefer an automatic engine running at a constant speed, and I believe that he would if he could get as good ones abroad as we can in this country. For starting, an almost unlimited torque is secured by gradually increasing the generator field strength and speed, which sends a current through the motors, rising smoothly from zero to that current sufficient to start the motor armature. If we leave the field controller and throttle in this initial position, our train will start smoothly, and will continue to move slowly, using the full current, but producing the current with about 50 volts, or $\frac{1}{10}$ of the full voltage, and we will be producing this power, about $\frac{1}{10}$ of that required at full speed, by a steam engine using steam expansively instead of, as in the steam locomotive, full stroke. But of course we desire to accelerate the train rapidly, so we keep on manipulating the field controller and throttle, until we finally have the engine driving the generator at full speed in a field of full strength, which will, of course, represent the full power of the locomotive. When we reach a grade requiring three times the torque required on the level, we weaken the field to $\frac{1}{3}$ of its full strength. We will then move up the grade at about $\frac{1}{3}$ of the speed on the level while using the same power as was required on the level.

It will be noticed that under the electrical arrangement on this locomotive, the electric energy is used in such a manner that its voltage is varied in proportion to the speed desired, and the amperes are in proportion to the torque required, so that the electrical energy produced is utilized in the most efficient manner possible.

Since this method of control of mine has been repeatedly criticized before this institute on the score that a generator of such size and type when used as described would spark disastrously, I beg leave to say that I scrutinized most carefully the commutator of the generator which had supplied the current during the locomotive's 2,200 mile service, and I never saw a commutator and brushes in more perfect condition, and the engineer assured me that under no circumstances had there been any sparking whatever. I regret that my method of control does not fit the generally accepted self-induction theory of sparking, but am forced to conclude that, as something is evidently wrong, it must be the theory which fails to agree with the facts.

An electric locomotive of this kind would probably cost for the first few about $30,000, each being equipped with a 1,500 H. P. boiler of our best marine type, and one of our best automatic cut-off compound engines directly coupled to a modern multipolar generator. I believe that a locomotive of this type could be built which would be able to pull 50 per cent. more weight than any of the present steam locomotives, and that it could pull the same weight at 50 per cent. higher speed. I think this type of electric locomotive is the stepping stone between the steam locomotive and the electric locomotive operated from a distant central station.

To properly try the experiment of operating a high speed locomotive of 1,500 H. P. from a central station would undoubtedly cost nearly a million dollars. To try it with a locomotive of the Heilmann type would cost not more than $50,000, and if it proves successful it is not much of a step to replace the boiler and constant speed steam engine with the moving contact and constant speed electric motor for driving the generator already tested and proven satisfactory.

* * *

NATIONAL ELECTRIC LIGHT CONVENTION.

The convention of National Electric Light Associations in Cleveland closed last Thursday. The association voted to hold its next meeting in New York. The following officers and committees for the ensuing year were elected:

President, C. H. Wilmerding, Chicago, Ill.

First Vice-President, Frederic Nicholls, Toronto, Can.

Second Vice-President, E. F. Peck, Brooklyn, N. Y.

Executive Committee, E. H. Lewis, Williamsport, Pa. (one year); W. R. Gardener, Pittsfield, Mass.; George A. Redman, Rochester, N. Y.; J. J. Burleigh, Camden, N. J.

RAIL-BONDING, AND ITS BEARING ON ELECTROLYTIC CORROSION.*

By George P. Low.

Investigations into the characteristics of electrolytic corrosion of underground metal work by the earth return currents of electric railway circuits, and the methods suggested for remedying the troubles therefrom, lead to the conclusion that the problem of electrolytic corrosion and of rail-bonding electric railways may best be considered conjointly, for in the solution of one may be found that of the other. The conditions of the many electric railway systems I have examined on the Pacific Coast demonstrate that in such roads electrolytic corrosion is evidenced when the return circuit is in one or more of the several conditions soon to be described.

As explanatory of the terms used, the word "main" refers to the water main, gas main, Edison tube, telephone or telegraph cable, or the other underground metal structure that may be affected. In compound words consisting of two nouns connected by the proposition "to" a noun appearing first indicates that it represents a positive polarity, as in the expression "main-to-track-bonding," the bonding is between a positive main and a negative track. Conversely, "track-to dynamo-bonding" indicates that a track having a positive polarity is bonded to the negative side of the dynamo. All generators are assumed to feed positive to line. By "cross-bonding" is meant the bonding between main and track without reference to the polarity of either.

The several conditions referred to as causing electrolysis, and which describe actual cases are as follows:

1. When the track conductivity is low.

2. When the track is bonded with various points of mains without regard to the polarity of the main or track, and is poorly bonded or not bonded with the negative of the dynamo.

3. When mains connect one portion of a track to a distant portion, there being no proper cross-bonding.

4. When the mains show positive potentials at one or more locations, there being no main-to-track or main-to-dynamo bonding at such points.

The preceding present the ordinary conditions conducive to aggravated forms of electrolysis, all of which may be summed up, though less distinctively in the single declaration that corrosive electrolysis occurs when a main shows a positive potential at any point, without proper main-to-track or main-to-dynamo bonding.

5. When the track is not bonded to main or dynamo, there being only main-to-dynamo bonding.

This case is significant in that it exhibits an electric railway system which shows unusual considerations for the interests of a water company to the material detriment of the coal pile of the former.

6. When the track is intimately cross-bonded with mains throughout, without regard to the polarity of either main or track, there being no track-to-dynamo or main-to-dynamo bonding, and ground plates only being used.

The importance, not to say enormity, of Case 6, is shown in a remarkable example of corrosive electrolysis that was uncovered in the writer's presence. In a certain lighting and power station situated off the line of the railway system, an earth return was used exclusively, in order to avoid the expense of carrying negative feeders out to the track. Ordinary ground plates proving inadequate, a two in. iron pipe with a No. 0000 wire inside was driven to a depth of about ten feet to the water line under the station, and a second No. 0000 wire was carried out to the river several hundred feet distant and sunk, with some 40 feet of bare wire attached. This being still inadequate, a No. 0000 wire was attached to a six in. water main running into the river, and which was independent from the city mains, when good results were obtained. The method of cross-bonding consisted in tapping $\frac{3}{4}$ in. tinned brass plugs into the cast-iron water main at intervals of 1,600 feet over the entire system. Four strands of No. 1 wire or two strands of No. 0 wire used in this cross-bonding. These wires were soldered to the plugs, and driven-bonded into the rails after the usual manner. In making alterations in the power-house last summer it was deemed advisable to lower the height of an engine which rested upon a foundation probably 15 feet deep, the foundation consisting of one part of Portland cement to three parts of clean sand and five parts of broken stone. The engine was bolted down to this by means of six $\frac{7}{8}$-in. bolts, each about 4 feet long, each bolt being sulphur-centered in a 2-in. iron pipe, $4\frac{1}{2}$ feet long, the pipe being set in the cement, the bolts projecting above. The whole foundation top was flushed with $\frac{1}{2}$ in. of sulphur, upon which the engine was placed. Upon removing the engine and chiseling off 8 in. of concrete it was found that four bolts were in prime condition. The fifth bolt, which was out of the pipe center because of having been bent, was corroded on the side nearest the pipe to a depth of approximately $\frac{1}{8}$ in., while the iron it had lost was deposited in the form of a sulphide upon the inner side of this pipe. Figs. 1 and 1*a* show the condition of the sixth bolt as it was taken from the concrete. Parts of the interior of the pipe bear the familiar marks of electrolytic pitting, probably occasioned at a time when negative was fed to line. The fact that the bolt was entirely corroded through is evident, as is the further fact that the iron taken from the bolt is deposited upon the inside of the pipe. The photographs clearly show streaks or veins of impurities that were developed in the sulphur, which, it would appear, presented the usual conditions favorable to corrosive electrolysis. Had it been possible to reach the lower end of the pipe, marked corrosion on it would have undoubtedly been found. Obviously the principal condition leading to this experience was the fact that the boilers, engines, steam fittings, and even the concrete foundations, served as a path for the return current. That the current was making a frantic effort to reach the ground plate was evident, and it would be hardly possible to find a more significant specimen of the insidious character of corrosive electrolysis, which is here proved capable of attacking ordinary inaccessible metal substructure. Having learned of this occurrence, the prudent station manager will see that his machinery shows absolute zero to the negative of his railway generators, or perchance some day his most trusted engine may gyrate through the station, causing ruin that would make a tornado envious.

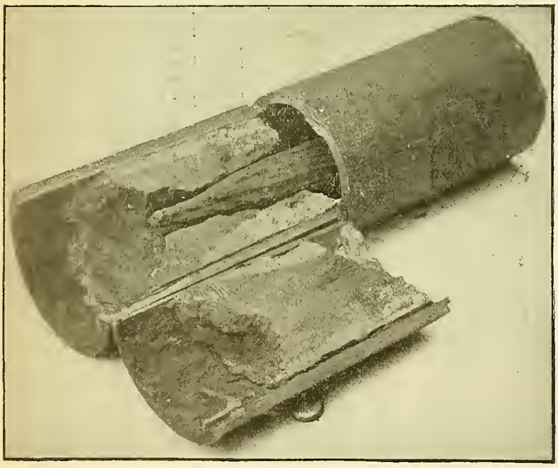

FIG. 1.

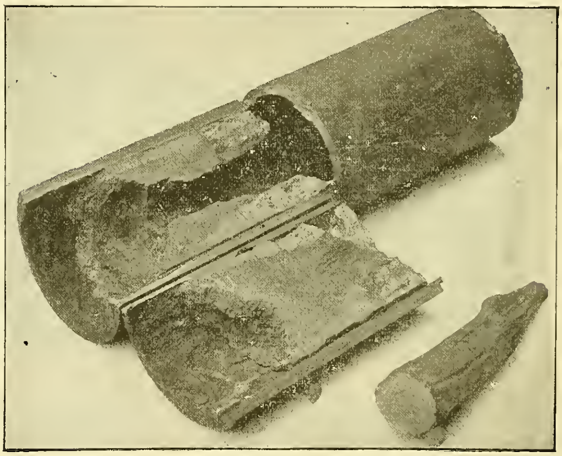

FIG. 1a.

In addition to the six conditions named, which are taken from actual experience, there yet remains a case that is as distinctive as it is perplexing. Both the corrosive action itself and the local conditions are so unusual that all details will be related. Fig. 2 is a map showing the location of the power-house and the affected water main, which consists of an 8-in. kalomine pipe under a street of a city, that is undoubtedly one of the most trying locations for underground ironwork on the face of the globe. This is owing to the fact that the earth is almost saturated with a solution of sulphate of copper that seeps down from enormous copper mines on the hills through the ground under the city. The avidity with which this solution attacks iron is shown in the fact that the iron pipes used in pumping the cupric sulphate water out of the copper mines seldom lasted a month, until a preventive was found in lining the pipes with wood. Kalomine pipe withstands copper solutions better than cast or wrought iron, but now an extraordinary trouble has appeared that seems to present a new and unrecorded form of corrosive electrolysis.

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* A Communication in Discussion of a Paper, by Isaiah H. Farnham, on the Destructive Effect of Electrical Currents on Subterranean Pipes, read before the American Institute of Electrical Engineers, April 18th and 25th, 1894. See Street Railway Gazette, April 21, 1894.

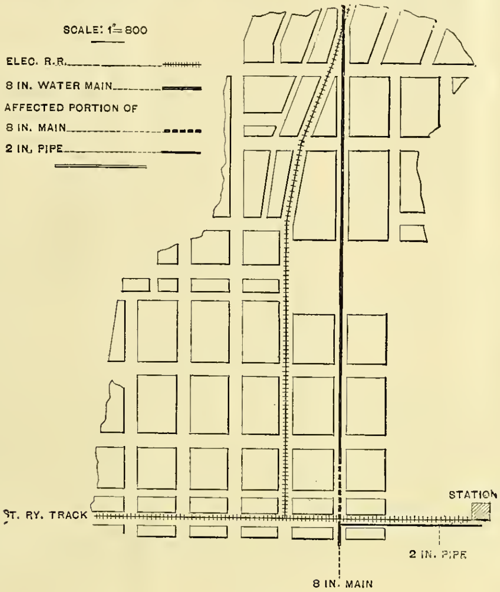

FIG. 2.

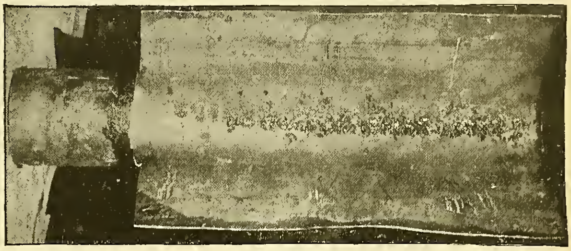

FIG. 3.

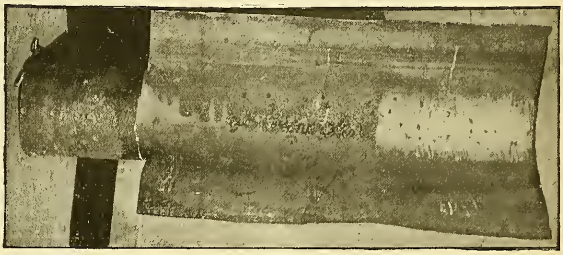

FIG. 3a.

The map shown in Fig. 2, together with the explanation accompanying it, conveys all information necessary concerning the location of tracks, water main, the power-house, etc. The negative of the generators is grounded by two No. 0 wires, one to the track and the other to the 2-in. iron water pipe furnishing water to the station from the affected main. The affected portion of the 8-in. main referred to is about 300 feet in length, as shown on the map, and so serious is the action that its life seldom exceeds eight months. The peculiarity of the corrosion is, in fact, that the pitting invariably occurs on the inside, working outward.

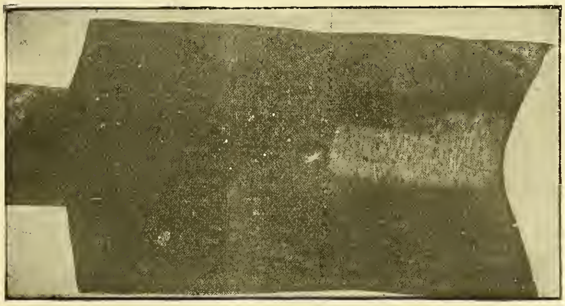

FIG. 3b.

FIG. 3c.

Fig. 3 shows a photograph of the interior of a short length of this pipe within 22 in. on which are 18 perforations, all of the character described, and inside the pipe are clearly seen other pittings that have penetrated from within outward to various depths, from the merest fraction of an inch to almost a complete perforation, also the sediment running longitudinally along the center that has been deposited from ordinary causes.

Fig. 3*a* exhibits the same specimen with the sediment on the right hand portion of the pipe scraped off, in order to show more clearly the fact that the pittings occur from the inside.

Fig. 3*b* shows the specimen set up and photographed against the sun, which proved the only way by which a satisfactory photograph of the perforations could be obtained. In one instance the sun, being immediately in range, the perforation is greatly exaggerated.

Fig. 3*c* is from an inferior photograph of the reverse side of the plate, which is in reality of a very smooth surface with many perforations.

A great deal of the same pipe is used throughout other portions of the city, but the internal pitting described occurs only on the 300-foot length defined. The exterior surface presents the usual rusted appearance, and, in view of the opinion recently expressed by an eminent authority,* that the corrosion of nascent oxygen liberated by the electrolysis of water is not an effect of practical magnitude, it is difficult to assign any satisfactory cause for the action. It has not been possible to obtain an analysis of the water in the pipe, but it is obtained from mountain streams 14 miles away and tastes pure and wholesome. Nor does it appear possible that the soil could affect the main internally. The fact that the trouble occurs at the point nearest the power-house affords circumstantial evidence against electricity, which is almost confirmed by the further fact that internal pitting and perforation is not to be found elsewhere in the city, even with the same pipe, water and other external conditions, excluding only the proximity of the power-house. It is for those having facilities for experiment to point out the action occasioning this internal corrosion and to indicate a cure.

Returning again to the usual forms of electrolytic corrosion, to relieve the main from injury, excepting that due to internal pitting and electrolysis at low conductivity joints in mains, it is advisable that the return current be confined to the track as closely as is possible. The most competent method of doing this in a double-track road appears to be in an adaptation of the three-wire system, in which one trolley wire forms the positive, the other trolley wire forms the negative, and the rails forming the neutral. In this particular arrangement, which is different from those three-wire applications now in use in different localities, if the rails and tracks are properly bonded, it is clear that under normal conditions the earth will be free from the enormous return current that at present seeks its way to the power-house by every possible channel.

Regardless of the carrying out of this eminently practical suggestion, however, electrolytic corrosion of mains from the earth return currents of electric railway circuits, will not occur when the following requirements have been complied with:

I. No cross-bonding at points where the mains show permanently negative potentials.

II. Heavy cross-bonding at points where the mains show permanently positive potentials.

III. Rail bonds of absolute permanence and reliability.

IV. High conductivity in track return circuit.

V. Greatest possible resistance from tracks and mains at points where the mains show permanently negative potentials.

VI. Generators to permanently feed positive to line and negative to track and main.

VII. Heavy bonding between the negative side of generators to various proper points of mains not heretofore designated.

It is hardly necessary to emphasize the fact that trouble occasioned by corrosive electrolysis is largely due to the inadequate conductivity of the rail return circuit, or, to repeat the oft-told truth, that the difficulty attending the use of the track, as a return, is at the rail joint. The welding of rails is now believed to have reached the commercially successful stage, and it certainly forms a perfect construction in every sense, but up to the present it has not come into general use. Whether its slow development has been due to inherent defects or to demands for excessive royalties, or other causes, has not been explained. A remedy may be found in another direction, and in looking for it the subject of rail joints must be thoroughly digested, not only electrically but from mechanical standpoints, both in steam and street railways.

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*Prof. D. C. Jackson on "The Corrosion of Iron Pipes by the Action of Railway Currents," read before the Western Society of Engineers, July, 1894.

The method of joining together the abutting ends of rails is known as fishing, a term doubtless originated by Mr. Thos. Tredgold, one of the honored fathers of the profession of civil engineering, who defines fishing as perhaps the simplest and best method of joining beams. Continuing in the same strain, Mr. H. Conybere, C. E., says:

> "Of rail joints there are two varieties, the suspended and the insistent fish. The former has to perform two functions, the latter only one. The suspended joint had first to act as a girder by giving vertical strength to the joint between the two rails; the fishes therefore required to be long and deep as possible, to be fastened by four bolts, and to have the bearing edges as nearly horizontal, in order to keep the two ends of the rail in accurate opposition, so that the joint might offer no obstacle to the smooth moving of the wheels. The insistent fish was not required to add to the vertical strength of the joint, such joint being supported by the joint sleepers or ties. the only function it had to fulfill was to maintain the extremities of the continuous rail in accurate opposition. For this purpose a much shorter and shallower fish than would be required in suspension, answered every purpose."

Another writer says:

> "If rails were very deep the fish-joint would leave little to be desired. When a heavily loaded train is caused to run along a rail, it will be found to continually deflect under the insistent strain, and this deflection is transmitted onward in advance of the wheel, the rail assuming a curve in a vertical plane of greater or less length. When the wheel approaches a weak joint on a shallow rail, the curve is rudely broken. The stiffness of the joint principally depends on the section of the rail, often only a third of the stiffness of the joints is afforded as compared with the solid rail. Improved fish-joints give 80 per cent. of the stiffness of the solid rail."

Experiments made with two deep fish-plates having supports two feet between the centers of ties, and carrying a load of 25 tons shows, more deflection on the solid rail than on the joint. The bolts were not the least hurt during the test. (Sandberg.)

A certain amount of elasticity is essential to the durability of the rails, which is the reason for the preference given to wooden ties. The compression of new ties under an engine is found to be from ¼ inch to ¾ inch sometimes with old ties. Beside the movement in the tie itself, there is also a movement of the tie upon its bed, and these are the sole causes of the deflection of the rail. Considered as a beam to support an insistent weight, a rail of over 60 pounds per yard is abundantly able to stand up under five times the pressure that it will ever be called upon to bear. As regards deflection under a swiftly passing load, Mr. Bidder, President Institution of Civil Engineers, England, says, that if there was no rail in a space of 3 feet, at 40 miles per hour, the wheels of an engine would not deflect more than ⅛ inch from gravity, therefore if a rail deflected more than ⅛ inch, no further pressure from the engine could occur. Captain W. H. Taylor, another authority, expresses the opinion that when the rails are shallow, or are wanting in depth, the blows become serious, but when the section is deep, and the ties are sufficiently near together, the deflection of rails under a passing load is imperceptible. The most instructive expositions of the principles of track construction are two pamphlets on "Smooth Track," from the pen of Mr. Philip Noonan, of Troup, Texas, who is a pioneer in the advocacy of continuous rails, and to whose researches is due much that is known concerning wave motion in the rails.

It is evident from the foregoing that steam roads are designed to operate on a yielding roadbed, which gives from less than ⅛ in. to ¾ in. or more as the train progresses, the train being continually preceded by a wave of depression. This is a feature that becomes marked in considering the points of divergence between the requirements of steam locomotive railroads and street railroads. The latter is required to be operated at from 5 to 15 miles per hour; the routes they traverse are occupied jointly by all kinds of vehicles, hence the conditions are that these streets and highways shall be so paved as to support such traffic. This requires the placing of the top of the ties 6, 7, 8 and 10 inches below the surface of the street, and has necessitated the use of much heavier rails than those required on other lines of railway. When it is known that a rail is to be regarded as an iron beam, the stiffness of which is as the cube of its depth, the fact that the key for deriving a solution of the question of how to obtain a smooth line of rail has been reached, can be realized. The supported joint is preferable for street railroads because of the solidity and immovable character of the roadbed; the locomotive roads require the suspended joint so as to be in keeping with the elastic character of their roadbed. The difference between the two roads lies in the magnitude of the wave of depression passing along the rails under the traffic peculiar to each system. In the steam road the wave of depression is clearly defined and considerable; in the street road with its concrete bed and perfected construction if such wave exists at all it is negligible, and owing to the extreme rigidity of the joints; the abutting ends of rails certainly have no appreciable play. This is a point to be borne in mind.

The expansion of rails from increased temperature presents a further point that has long been considered insurmountable, but recent experiments of great engineering value indicate the end of trouble from this cause. Mr. A. J. Moxham, in experimenting upon a roadbed in actual operation, placed 1100 feet of 78-pound track in such a manner that it practically formed a continuous rail. The joints were made with the utmost rigidity, and many thousand temperature and other essential readings were carefully taken periodically day and night during the months that the experiment lasted. In Mr. Moxham's own words:

> "The experiment proved absolutely and beyond cavil that the track is restrained and held by surface friction of the surrounding roadbed. From first to last, from a temperature 22 degrees below freezing point (or 10 degrees) to a temperature of 89 degrees above freezing point (or 121 degrees) there was absolutely no movement of the track out of place. Even at the ends this was true; proving that not only will the roadbed hold the track as a complete structure, but that it will do it consecutively. Once bedded, it will hold a rail 10 feet or 30 feet as well as one 110 feet. On this point there is no room for error."

A further experiment in this direction was made by Mr. Wason, of Cleveland, who, in order to get as nearly as possible a continuous rail, put down 1000 feet of track, riveting the joints with red-hot bolts put in by boiler makers, and placing the ends together as closely as possible, six rivets to each joint. It was just as straight after ten months as when first put down, the joints being absolutely imperceptible.

(To be continued.)

FINANCIAL NOTES.

Receiver Appointed in St. Paul, Minn.—A Receiver has been appointed for the St. Paul & White Bear Electric Railway Company. The road has not paid operating expenses. The company owns 11 miles of track and 9 motor cars.

West End Earnings.—It is stated that the West End Street Railway Company, of Boston, is now earning over 10 per cent. on its common stock, but it is said that the dividend of 6 per cent. will not be increased. A surplus will be accumulated, with which extensions may be built and improvements made.

Receiver Appointed in Winona.—S. B. Livermore, of St. Paul, has been appointed receiver of the Winona (Minn.) General Electric Company by Judge Sanborn, of the United States Circuit Court at St. Louis, upon application of the Old Colony Trust Company, of Massachusetts. This company owns the local street railway.

Tiffin Road Ordered Sold.—In Tiffin, O., last week, Judge Schaufelberger ordered the sale of the Tiffin and Inter-Urban Consolidated Railway, and decreed that the Tiffin Electric, the Triffin Street Railway, and the incompleted Tiffin and Fostoria roads, be sold separately. Arrangements have been made for the purchase of the Tiffin and Fostoria line, and it is stated there is no longer any doubt about its completion.

Consolidation Annulled.—The Missouri Supreme Court has issued a decree annulling the consolidation of the Grand Avenue Cable Railway and the Kansas City Cable Railway companies. The decree was issued on an appeal made by the minority stockholders of the two companies, who claimed that the consolidation was made without their consent or knowledge and against their rights as such minority stockholders.

St. Paul and Minneapolis Traffic.—The Twin City (St. Paul and Minneapolis) Rapid Transit Co. earned $220.170 net last year. Receipts were $2.003.678; operating expenses, $890,030. The assets are $23,577,302. The floating debt of the company amounts to $2,614,171.63. It is proposed to issue April 1 $3,000.000 7 per cent. cumulative preferred stock. The sale of $2,600,000 of this stock at par will pay off all indebtedness except $10,298.009 of bonds.

Mt. Auburn Cable Sold.—Alfred G. Hill, receiver of the Mt. Auburn Cable Railroad Company, Cincinnati, O., sold the road at auction this week for $150,000 to David Sinton. The terms of the sale were cash. It is understood that Mr. Sinton bid the road in for the third mortgage bondholders. The price paid is equal to about $400,000. The sale is subject to the rights of the holders of $200,000 of first mortgage bonds, with $24,000 of unpaid coupons, and $22,000 of second mortgage bonds, with $2,621.50 of coupons outstanding. The property is appraised at $575,000.

Receiver Asked for in Carlisle, Pa.—A bill in equity with the Cumberland Valley Traction Company as defendant has been filed in the Prothonotary's office in Carlisle, Pa., by W. F. Sadler, counsel for Frank Bates, Harry Smith and John Spotts. The bill alleges that the Traction Company is insolvent, and asks for the appointment of a receiver. The bill relates that the Cumberland Valley Traction Company was chartered December 18, 1893, and that April 2, 1894, it executed a mortgage to the Farmers' Loan and Trust Company of New York to secure bonds, with coupons attached, amounting to $100,000, payable 20 years after date, with interest payable semi-annually. The court granted the rule as prayed for, returnable on the 4th day of March.

Tacoma Railway and Motor Company Receivership.—G. W. Bord, receiver of the Tacoma Railway and Motor Company, of Tacoma, Wash., has made a report of the results of operation since the receiver was appointed Jan. 24. The statement shows a falling off of business during the year 1894, the receipts for the month of January, 1894, having been $11,279.99, while in January, 1895, the receipts were but $9.735.71. In view of this reduction of business, the receiver at once commenced to reduce the expense of operation as largely as possible without decreasing the efficiency of the service, with the result that the property has earned, since the appointment of a receiver, $1,264.30 net. Prior to his taking the affairs in hand the road was losing on an average $130 a month.

Long Island Traction.—Stockholders of the Long Island Traction Company held a meeting this week. There were nearly 60 stockholders present, representing $12,000,000 of the $30,000,000 total. John G. Jenkins, president of the First National Bank of Williamsburgh, made a somewhat extended speech, stating the purpose for which the meeting had been called, which, in effect, was to take steps for a reorganization of the company. Mr. Jenkins announced that the offer of a syndicate to take the whole of the traction company's stock at $10 per share had been withdrawn. Nothing remained but to do the best that could be done for the protection of the holders. A resolution for the appointment of a committee of six to confer with the officers of the company was adopted. The committee will formulate a plan of reorganization.

Suits Begun by Receiver of the Great Western Electric Company.—H. B. Moore, receiver of the Great Western Electric Company, of Duluth, Minn., has begun suits against the Boston American Loan and Trust Company and the Maine electrical corporation. Fraud is alleged, and two injunctions are asked for. Mr. Moore charges that on Nov. 13, 1894, the vice-president and secretary of the Great Western made a pretended mortgage, dated Nov. 1, in favor of the American Loan and Trust Company, without the directors' authority, in order to secure $100,000 of the illegal bonds, which the same men had signed without authority. The mortgage covered everything except the goods manufactured and in process of manufacture; $80,000 worth of bonds, it is alleged, were sent to the trust company to delay and defraud the creditors, and by the trust company transferred to the electric corporation, in accordance with a scheme to give the main concern preference over other creditors. There was no consideration. It is further charged that the trust company is threatening to deliver the remainder of the bonds to the Great Western, that the directors of the latter are intending to ratify the mortgage and bonds, and that the main concern is about to sell the bonds in its possession to innocent parties. The receiver wants the trust company restrained from delivering the $20,000 of bonds to the Great Western and asks that they be delivered to himself. He also wants the main corporation restrained from selling the $80,000 of bonds, and, wants the mortgage declared null and void, in order that all creditors may stand on an equal footing.

NEW INCORPORATIONS.

Schenectady, N. Y.—The Schenectady Railway Company has been incorporated with a capital stock of $300,000. The promoters are: P. F. Kobbe, W. H. White, A. C. McAndrew, New York City, N. Y.

Harrisburg, Pa.—The Harrisburg & Cumberland Electric Railway Company has been incorporated, with a capital stock of $36,000. The promoters are Wm. L. Corgas, Frank R. Leib, S. W. Fleming, Harrisburg, Pa.

Seattle, Wash.—The Third Street and Suburban Railway Company has been incorporated, with a capital of $100,000. The promoters are: Augus Mackintosh, A. M. Brookes, Frederick Bausman, W. C. Crambs, Thos. Boyd, David T. Denny, D. T. Denny.

Charleston, W. Va.—The West Charleston Street Railway Company has been incorporated to build a street railway from Two-mile Creek to Wilson's Hollow, along the Great Kanawha river, etc. The promoters are Geo. S. Couch, P. Silman, Geo. S. Laidley, Malcolm Jackson, Charleston, W. Va.

Batavia, N. Y.—The Batavia Street Railroad Company has been incorporated to operate an electric street surface railroad from Batavia to Horse Shoe Lake, a distance of 7½ miles; capital,

$75.000. Directors: Amos H. Stephens, A. B. Wilgus, J. H. Wilgus, J. S. Lindsay, C. C. Marsh, of New York City; H. R. Burdick, of Malden, Mass.: E. P. Wilgus and Mark Sugarman, of Brooklyn: F. J. Fadner, of Chicago.

Reading, Pa.—A charter has been granted to a company to build an electric railway from Reading to Allentown. The capital stock is $100,000, and Dr. J. S. Trexler, of Kutztown, is president. The building of the road has been agitated for sometime, and a portion of the right of way has already been secured. The road will not closely follow the present East Penn Railroad between the two cities, but will touch a number of important places some distance away through the Maxatawny region and the East Penn Valley.

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NEWS OF THE WEEK.

Philadelphia, Pa.—The Philadelphia Traction Company has paid $45.690 to the city solicitor as taxes on dividend declared in 1894.

Halifax, N. S.—The horse car stables of the Nova Scotia Power Company with 16 cars burned on Feb. 21st.; loss, $30,000; fully insured.

Kansas City, Mo.—Contracts are to be let at once for the electrical equipment of the Kansas City & Independence dummy line, which is controlled by the Kansas City Cable Railway Company.

Baltimore, Md.—The City and Suburban Company has reduced the wages of the conductors on the Lakeside, Point Breeze, Woodbury and Lexington extension, and there is talk of a strike.

Trenton, N. J.—The Bullock bill fixing street car fares at three cents between the hours of 5 and 7 o'clock in the morning and evening was disposed of last week by an adverse committee report.

Yankton, S. D.—Commodore Kountz, of Pittsburg, a large property owner in Yankton, has made a proposition to the municipality to construct and operate an electric street railway in the city.

Adrian, Mich.—It is expected that the street railway will soon resume service under the superintendence of Clifton T. Geddes. New motors have been purchased, and it is said five cars will be run.

Chicago, Ill.—Mayor Hopkins has vetoed the ordinance of the South Chicago City Railway Company, by which it was given the privilege of occupying about nine and a half miles of streets.

Syracuse, N. Y.—The Syracuse & East Side Railroad Company is contemplating the construction of an electric railroad to South Bay. The projected road will be about 10 miles long and will pass through the center of the town of Cicero.

Duluth, Minn.—The street railway company is arranging for an extension of its line west, through Ironton to New Duluth, a distance of about five miles. When the line is built it will be possible to ride from Woodland to New Duluth, 14 miles, for five cents.

Lansing, Mich.—The barns of the Lansing Electric Street Railway Company, together with five motor cars and all of the company's trailers, were destroyed by fire on Feb. 21. The company will be unable to continue service for the present. The loss is $25,000.

Pontiac, Mich.—At the meeting of the Pontiac common council, the franchise asked for an electric street railway by John D. Norton, Thaddeus A. Smith and William G. Hinman, of Pontiac, and George H. Barbour and M. B. Mills, of Detroit, was granted.

Quebec, Que.—Mr. Beemer will begin the construction, as soon as the weather will permit, of an electric railway in and around the city of Quebec. He will also construct a line to the famous line of La Bonne Ste. Anne, and promises a half-hour service from the city to the shrine.

Springfield, Mass.—The West Springfield selectmen have made out in full the location of the tracks, and the conditions which must be conformed to by the street railway company in accepting the franchise given by that town to construct maintain and operate the proposed line to Holyoke.

Chicago, Ill.—A street car belonging to the Chicago Lawn Street Railway Company was struck and demolished at the crossing by a Calumet terminal freight train, which was running at a rate of 10 miles an hour. Three persons were severely injured, while everyone in the car received minor bruises or cuts from broken glass.

Joliet, Ill.—J. A. Henry, the president of the Joliet street railway company, has petitioned the city council for an extension of the term of franchise, and in return promises that from $75,000 to $100.000 will be expended in extending and improving the system. The extension of the line to Lemont is still being considered.

Goshen, Ind.—Contractor W. W. Hatch has begun the distribution of ties for the extension of the electric street railway to the company's new acquisition, part of the Shoup farm, where the power-house and other buildings are to be erected. The road will be completed to the site in order to convey the material, etc., there.

Boston, Mass.—The Trackmen's Union of West End Street Railway Employees have adopted resolutions opposing the proposition to place mail cars on the West End road. It was declared that the West End management merely wished to use mail cars to defeat any attempt of their employees to advance wages or resist reductions.

Philadelphia, Pa.—The Select Council has passed the ordinance requiring all passenger railway companies using electricity to provide suitable fenders ninety days after the passage of the ordinance. For failure to do this, a fine of $10 per day for each car shall be imposed, and, if the violation shall continue thirty days, the fine will be $40.

Fall River, Mass.—The Board of Aldermen has granted location within the city limits to the Fall River Street Railway Company, a local corporation, with $50,000 capital stock. The location leads to the Taunton river, and provides for extension to both Taunton and Providence, if desired in the future. The company has agreed to a three-cent fare during the hours in which working people use the cars.

St. Louis, Mo.—A bill has been introduced in the City Council authorizing the Magnolia Avenue Railroad Company to construct and operate a double track railroad. The consideration named is the payment of $500 a year for the first five years; $1,000 a year for the next five years, and $2 000 a year for the remainder of the life of the franchise. The franchise covers a period of 40 years. Work is to begin within one year, and the road completed within two years.

Reading, Pa.—When the Reading & Southwestern Electric Railway received permission to occupy about five miles of additional streets, so that it could reach the eastern and northern sections of the city, the stipulation was made that the guage of its tracks should be 5 feet 2 inches. After a number of efforts at previous meetings. Councils this week finally passed an ordinance changing the width of the tracks of the company's extension to 4 feet 8½ inches, its present gauge.

Trenton, N. J.—A scheme is said to be on foot for the construction of an electric railroad from Trenton to Asbury Park. The promoters of the enterprise are reported to be the owners of the Seashore Electric Railway Company, of Asbury Park. This concern has purchased the West End and Long Branch Railroad and this summer the road will be in operation from Pleasure Bay to Asbury Park, connecting at Long Branch with the steamboat line running to New York. An extension of the road to Point Pleasant this spring has been decided upon.

Brooklyn, N. Y.—P. H. Flynn has secured from the Supreme Court a temporary injunction restraining the Brooklyn City Railroad Company, the Brooklyn Heights Railroad Company, and the New York Guaranty and Indemnity Company from interfering in any way with the guarantee fund of $4.000,000 in cash deposited by the Brooklyn Heights company when it leased the stock and franchises of the Brooklyn City company, The fund was to secure the stockholders of the Brooklyn City company against any default on the part of the Brooklyn Heights company in the payment of 10 per cent. of $12,000,000 capital, or $1.200,000 yearly,

Allentown, Pa.—The Allentown and Kutztown Electric Railway Company is asked to lay its track in the city limits. The projectors claim they have received nearly all the franchises between Allentown and Kutztown, and now want City Councils to grant them the privilege of a few streets in this city. From the western limits of the city the line is to pass through several villages, passing near the State fishery and thence running direct to Emaus. From this point the road is to be run parallel with the East Penn Road, and is to strike Macungie, Alburtis, and in fact all the towns along there as far as Kutztown. Loops to Trexletown, Fogelville and Breinigisville will be built, and the line is eventually to be built to Reading.

Reading, Pa.—Daniel Miller and William Grant, Supervisors of Spring township, this county, recently signed an agreement to allow the Birdsboro Electric Railway Company to extend its tracks along the Berks and Dauphin Turnpike Company, from Schuylkill river to the western line of Spring, upon certain representations made to them and upon certain conditions. These supervisors have now rescinded their action on the ground that "there is no such railway in existence in Birdsboro," from which an extension can be made, and that the railway company has not accepted the conditions. The supervisors, after annulling their agreement with the Birdsboro Railway Company, signed an agreement giving the Reading and Womelsdorf Railway Company the right to lay tracks through Spring.

Canton, Mass—The Canton & Sharon Electric Railway Company is to be organized. It is proposed, if the franchises are granted by the towns of Sharon and Canton, to build a road from the foot of Blue Hill, where the West End road, of Boston, will connect, and from there through Ponkapog to and through Canton, to and through Sharon to Lake Massapoag, where it will end at the Massapoag House. The capital stock will be $50.000, and it is proposed to bond the road for $50,000. The company does not propose to build a power house, but will get its power from the Blue Hill Electric Company at Canton. It is eventually proposed to extend the road to either Foxboro or Mansfield, and at some future time connect with the Interstate Electric Railway, making a continuous road from Boston to Providence.

Meridian, Miss.—The Mayor and City Board have closed a contract with J. F. Donovan, H. A. Brady, John F. McDermott and E. B. Tyler, of St. Louis, for the city lighting, embracing 75 2,000-candle power electric lights. The contract covers a period of seven years, and the city reserves the right to renew it at the end of that term if desirable. The gentlemen named have also closed negotiations for the franchises and equipments of the present street railways, and will begin at once the work of extending the lines to all parts of the city, and will also put on electric cars. It is understood the orders for all machinery, engines, boilers, etc., as well as for the entire equipment, will be placed at once. Work, it is said, will begin within two weeks, and the electric cars will be in operation through the city within five months.

St. Louis, Mo.—The Citizens' Railway Company has filed its exceptions to the report of the commissioners awarding it a compensation of $15,485.90, to be paid yearly by the Grand Avenue Railway Company for the use of its tracks on Grand avenue, between Natural Bridge road and Easton avenue. It claims that the award is not a just compensation for the use of the tracks and the damage sustained by the company, that the commissioners erred in not including in their award the damage to be sustained by loss of passengers, who, but for the Grand Avenue Railway Company, would be carried by the Citizens' Company, and that they erred in not including in the compensation the amount which the Citizens' Railway Company is now paying and would have to pay to the city as special tax for the privilege of constructing, operating and maintaining its tracks on Grand avenue. The Grand Avenue Railway Company's objections have been filed. It finds the $15,485 award an exorbitantly high one, and it thinks the amount it should pay for the occupancy of the tracks ought not to exceed $1,500.

Gettysburg, Pa.—It is announced that the syndicate that lately purchased the Gettysburg Electric Railway has made a proposition to the United States Commission for an adjustment of the existing differences. It amounts to an acceptance of the terms held out by the Government. The company offers to abandon the road through the Valley of Death and around the Devil's Den region and that portion in front of the Second Corps line on Cemetery Ridge, upon the stipulation that the Government shall furnish them with the route over the Wheat Field road, and also a route along the crest of Cemetery Ridge, east of Hancock avenue, from Seigler's Grove to the tracks of the Reading Railroad branch. This would seem to be entirely acceptable to the Government; but, as the Commissioners are at present absent, no definite reply can be made. The Government is to pay for the cost of removing the tracks. Upon the acceptance of the proposition, the railway engages to withdraw its appeal and all the proceedings in the matter of the condemnation of their route now pendiag in the United States District Court at Philadelphia.

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PERSONALS.

Mr. George J. Marott, of the National Street and Station Indicator Company, of Indianapolis, was in New York last week.

Mr. W. E. Davis, Electrician of the Toronto Street Railway Company, will shortly leave Toronto to assume a position with the Detroit Railway Company.

Mr. A. P. Dupont, of Louisville, Ky., has been appointed General Manager of the Detroit Citizens' Street Railway Company to fill the vacancy caused by the resignation of J. D. Hawks.

Mr. John P. Zane, who received the first charter for a street railway granted by the California Legislature, and built the first street railway in San Francisco, died at his home in Bradford, Pa., Feb. 24.

Mr. Charles E. A. Carr, of the Toronto Railway Company, has been appointed Manager of the London (Ont.) Street Railway, vice Mr. S. R. Break, who is to take the management of the Detroit Railway Company.

TRADE NOTES.

The Stirling Company, of Chicago, has been awarded the contract for furnishing four 500 H. P. boilers for the new power house of the Detroit Railway Company.

The Binghamton Railroad Company, of Binghamton, N. Y., has recently issued a very interesting advertising pamphlet devoted to Binghamton, and containing many interesting views taken in the city.

The M. M. Buck Manufacturing Company, of St. Louis, announces that the railway and general supply machinery and tool business, heretofore conducted under the firm name of M. M. Buck & Co., has been sold and transferred to the M. M. Buck Manufacturing Company. The officers of company are M. M. Buck, president; A. H. Handlan, vice-president and manager, and E. W. Handlan, secretary and treasurer.

The Berlin Iron Bridge Company, of East Berlin, Conn., has just completed for the Hartford & West Hartford Horse Railway Company a new truss bridge, 136 feet long, over the Farmington River, at Farmington, Conn. The new boiler-house for the Stanley Rule and Level Company was designed by the Berlin Iron Bridge Company. The side walls are of brick, the floors of iron and the roof of iron, covered with the Berlin Iron Bridge Company's patent anti-condensation corrugated iron.

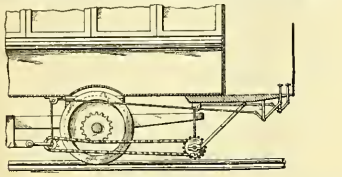
Factory of the Curtis Company For Sale.—The Curtis Electric Manufacturing Company of New York, is offering for sale its entire property, including patents, factory plant, etc. The patents cover all the features of the admirable Curtis motor, car controller, etc., used with great success on various roads, while the factory has a superb equipment equal to the production of 10 double motor street car outfits per week, day work only. The machinery is of the most modern design and is in excellent condition. The stock in hand includes motors, controllers, rheostats, etc., as well as various supplies. This opportunity is a rare one for any concern desiring to engage in the manufacture of electrical apparatus and wishful of securing an advantageous start. The Curtis Company can be addressed at P. O. Box 412, this city. Its factory is situated in Jersey City, close to the Pacific Avenue Station of the Central Railraad.

RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued Feb. 19, 1895.

534,290. Automatic Brush for Railway Tracks; George J. Smith, Covington, Ky. Filed June 25, 1894. The sprocket-wheel is upon the car axle and a sprocket chain connects the brush shaft and the rear sprocket wheel and extends beneath and in the vertical plane of the driving sprocket upon the car axle. Means are provided for raising and lowering the rear sprocket wheel. (See illustration).

534,312. Street-Car Fender; Roderick L. Burleson, Carrollton, Ill. Filed Dec. 20, 1894. This is the combination with a rocking frame supported in front of the car by an axis upon which it is adapted to oscillate, of a footboard or buffer-plank adapted to travel a limited distance to and fro in the direction of the car's length, on a forward projecting leaf at the foot of the rocking frame and forming a part thereof. The projecting leaf has secured to the front edge springs adapted to push the buffer-plank to the extremity of its forward travel, and yield when it comes in contact with an object upon the track. The forward edge of the buffer plank is cushioned with rubber or other suitable elastic material. There is a slot in the top of the buffer plank for the reception of a stud, secured in the leaf, so as to limit the travel of the buffer plank and retain it in position laterally. springs hold the rocking frame in normal position and springs also receive the back of the rocking frame when thrown down. A pawl retains it in that position, and a cord or chain retains the rocking frame at the required inclination when turned up.

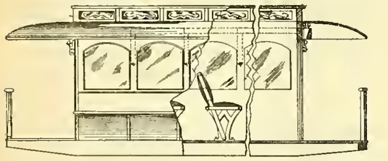


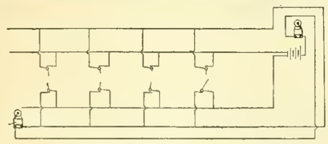
No. 534,290.

534,409. Car Guard; Charles P. Stimpson, Troy, N. Y., Assignor of one-half to Phebe R. Gunnison, same place. Filed Oct. 15, 1891. A canvas sheet is connected to the underside of the frame and therefrom extended under, around the front end of and over the said frame and extended rearwardly to connect with links having springs whereby when the frame is tripped and unlatched the canvas will, as the frame descends at the front, be drawn rearwardly to pass beneath the car-wheels.

534,411. Trolley Wire Support; Marmaduke F. Van Buren, Philadelphia, Pa. Filed Oct. 5, 1894, The U-shaped hanger is provided with screw-threaded lugs. The nut and the clamping pieces fit into the U-shaped hanger and have on the underside an opening for the reception of the enlarged or bent up ends of the trolley wires.

534,442. Ball Traction and Tread for Vehicles; John B. Linn, Cleveland, Assignor of one-half to O. S. Kelly, Springfield, O. Filed July 9, 1894. There is a casing having a channel for balls, and so constructed as to expose the balls at one or more places to form a bearing for traction, a power pinion engaging the balls.

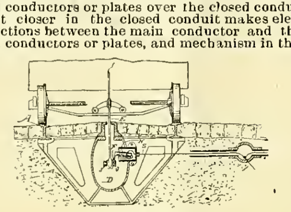




No. 534,485.

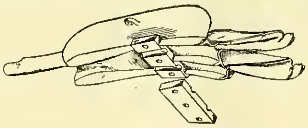
534,454. Conduit Electric Railway; Wilhelm Simon, Nuremberg, Germany. Filed March 3, 1894. Renewed Jan. 11, 1895. The conduit has supporting and conductor rails, and there is a motor carriage in the conduit. There is a car above the conduit, from which conduit the ends of the motor carriage are suspended. Means are provided for raising either end of the carriage from the car. There is an electric motor on the carriage, and combined contact and driving wheels on the carriage and in gear with the motor.

534,475. Conduit Electric-Railway System; William L. Hedenberg, New York, N. Y. Filed June 5, 1894. There are two separate parallel conduits, one closed and the other having an opening or slot. There is a main conductor in the closed conduit and sectional conductors or plates over the closed conduit. A circuit closer in the closed conduit makes electrical connections between the main conductor and the sectional conductors or plates, and mechanism in the open conduit operate the circuit closer to close the circuit, the main conductor and the sectional conductors or plates.



No. 534,519.

534,485. Electric-bell System for Street Railways; Edward L. Stansberry and Jacob Bettinger, St. Louis, Mo. Filed May 7, 1894. The bell system comprises the combination with a street car of two parallel conductors arranged along one side of the car and two parallel conductors arranged along the opposite side of the car, a single local battery to one electrode of which like ends of a conductor upon each side of the car are connected. A third conductor is located on one side of the car and extends parallel to the first mentioned conductors on the same side of the car, and has one of its ends connected to the opposite electrode of the local battery. Two separate electric bells are located one at one end of the car above the platform thereof, and one at the opposite end of the car above the platform at that end. Both of said bells are connected in series with each other with the third parallel conductor upon one side of the car, and with the single local battery, the bells being connected to the electrode of the battery which is opposite that to which the two parallel conductors are connected. A series of push buttons is fixed oppositely on each side of the car, one closely adjacent to each of the seats, and connected, the push buttons on one side of the car in multiple with two of the parallel conductors on the same side of the car in multiple with two of the parallel conductors on the same side of the car, and the push buttons on the opposite side of the car connected in multiple with two of the parallel conductors on that side of the car, whereby passengers without moving from their seats may conveniently extend one hand and push the button, and both of said bells will be simultaneously sounded. (See Illustration).



No. 534,592.

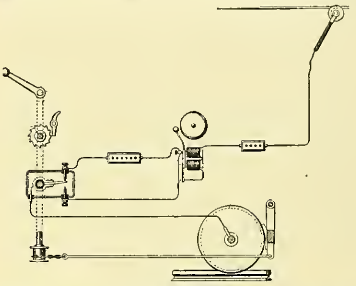
534,495. Conduit Electric Railway; Octavus Cohen, New York, N. Y., Assignor to Rebecca O. Cohen, same place. Filed May 15, 1894. One of the rails has an upwardly inclined groove continuous with the rail and a line wire supported within the groove by disconnected and inclined brackets. A trolley rod has an upwardly inclined contact portion depending from the car and electrically connecting the wire with the motor on the car.

534,511. Railway Switch; Frederick B. Kron, New Orleans, La., Assignor of one-half to Charles John Badger, same place. Filed Oct. 13, 1891. An L-shaped guide bracket projects down from the car and a slotted case on the under side of the car projects down to within a short distance of the horizontal member of the bracket. An arm works in the case, and projecting down through an aperture in the horizontal member of the bracket, the arm being provided with a pin projecting through the slot of the case. A spring in the case holds the arm raised. There are guide pulleys on the under side of the car and on the guide bracket, a vertically sliding foot bar on the car, and a cable passing over the guide pulleys and secured to the foot bar and to the pin of the arm.

534,519. Conduit Electric Railway; Alfred Rosenholz, San Francisco, Cal., Assignor of one-half to Samuel J. Clarke and Harvey S. Brown, same place. Filed May 22, 1894. This is a conduit electric railway having the slotted tube or tunnel. A main insulated conducting wire extends from the source of power parallel with the tube or tunnel, having branch wires permanently connected therewith and extending therefrom into the tube or tunnel at intervals. A wire is made up of independent sections extending continuously through the tube or tunnel, and a sectional insulating coupling between the sections of wire has the ends of the wire fitted therein. There is a tilting switch mechanism to which the wire is suspended, and movable devices whereby electric current is transferred from the main conductor to each of these sections successively during the passage over the section. (See illustration.)

534,592. Trolley Wire Switch; Frank M. Zimmerman, Detroit, Mich. Filed Nov. 2, 1893. The tabular body part has its under tabular side above the plane of the trolley wire. Holding arms terminate at its outer end with an overlapping hook, and each is provided with an upward leading wire support between its outer end and the body, and dependent guards. (See illustration.)

534,597. Electrical Alarm for Street Cars; George F. Atwood, Orange, Jonas W. Aylsworth, Newark, and Walter H. Miller, Orange, N. J. Filed May 28, 1894. The vehicle is provided with an electrical alarm bell having two sets of circuit connections to and through circuit controlling devices controlled by the brake mechanism, with means for varying the current supply to the magnets of the alarm bell whereby the bell may be rung moderately or violently at will. (See illustration).

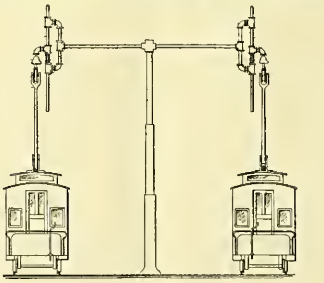


No. 534,597.

534,605. Trolley-Wire Crossing; Charles S. Hersh and Edwin F. Weaver, Philadelphia, Pa., Assignors of one-third to Alfred E. Clarke, same place. Filed March 13, 1894. The bridge has an open base, a rotatable bridge piece supported in the open base, and a pivoted arm on the bridge piece adapted to be engaged by a trolley, and normally standing in position to permit the trolley on a crossing conductor to pass without obstruction.

534,608. Tower-Wagon for Electric-Line Work; John H. Leonhardt, Baltimore, Md., Assignor to the Leonhardt Wagon Manufacturing Company, same place. Filed Dec. 29, 1891. To the body of a wagon, a frame is bolted to and has a central-pivot bearing. A circular track is secured upon the frame, a turn-table frame having a central pivot and rollers in each corner. Plates are secured to the frame and have lugs projecting within the frame. Vertical latches are pivoted to the sides of the turn-table frame for engagement with the plates

534,613. Trolley-Wire Support; Marcus T. Murphy, New Orleans, La., Assignor of one-half to Robert Beneberg, same place. Filed Sept. 14, 1894. The support comprises a post, a laterallly extending arm thereon, a bracket secured to the arm and provided with slide ways at top and bottom, a slide rod to move in the slide ways, a spring to support the slide rod and a wire-carrying hanger secured to the slide rod. (See illustration.)



No. 534,613.

534,617. Car-Fender; Richard F. Preusser, Washington, D. C. Filed Nov. 7, 1894. A pivoted frame projects forwardly from the car and carries a roller adapted to rest upon the road bed. A gravitating supplemental buffer is carried at the forward end of the frame and provided with a roller or rollers adapted to rest upon the road bed.

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As the STREET RAILWAY GAZETTE is published 52 times a year, and is the only weekly publication devoted to Street Railway Interests, its value as an advertising medium will be apparent to Manufacturers and Dealers in Street Railway Apparatus and Supplies of every description. We will take pleasure in quoting rates for advertising space.

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A New Mule Line. In our news columns this week appears an item of a kind that is seldom seen nowadays in a street railway paper. It announces the construction of a street railway at Biloxi, Miss., the motive power for which be supplied by mules. It is a long time since the STREET RAILWAY GAZETTE has noted any project of this kind. Animal power is a thing of the past, and if our friends at Biloxi are anxious for advice we would suggest that they purchase girder rails and bond them. The patrons of the line will not long be satisfied with mule traction. They will demand an electric road, and the directors of the company may as well make up their minds to accommodate them first as last.

Manufacture of Incandescent Lamps Unrestricted. The decision of the United States Supreme Court in the famous Bate Refrigerator case is likely to cause far reaching results in fields in which general manufacturing has been restrained by patents controlling fundamental inventions. One of the most conspicuous and important results of the judgment of the court will be the stimulation of the incandescent lamp industry, which will no longer be affected by the Edison patent. An immediate result of the competition that is bound to come will be cheapened prices for lamps; in fact, lower prices have already been announced. Street railway companies now purchase considerable quantities of incandescent lamps, and they are naturally pleased by the prospect of better and cheaper lamps.

New York Rapid Transit. The last meeting of the New York Rapid Transit Commissioners was the most important held since the creation of the Board. Definite action was taken to secure the construction of a comprehensive rapid transit system of underground and viaduct lines, to be operated preferably by electricity. The routes were laid out and the vexatious problem of the disposition of the pipes now buried in lower Broadway was attacked by the board. It proposes to reach a solution by causing the city to acquire the right to use for pipe galleries the vaults beneath the sidewalks on Broadway, thus leaving the width of the roadway clear for the construction of an underground road, with four tracks on the same level. This plan, it is estimated, will involve an additional outlay of $5,000,000, which the Legislature will be asked to authorize. The rapid transit system which the Board has laid out can be constructed, it is asserted, within the limits of the $50,000,000 which the people have voted to expend for this purpose. The scheme is a magnificent one, but it affords no immediate relief for which there is so urgent a demand.

Reports on Brooklyn Electric Roads. The street railways of Brooklyn continue to attract a greater share of public attention than all other roads in the country combined. They have of late been inspected with great care by the Board of Arbitration, investigated by the Railroad Commissioners and a legislative committee, criticized by a mayor's advisory committee, reported on by an aldermanic committee, considered by a grand jury, advised by a court, denounced by a public meeting, and overhauled generally by the daily press on innumerable occasions and with the greatest elaboration of detail. If any value, significance, or importance attaches to report, recommendation or criticism the Brooklyn roads should become models after which all other street railways in the country might well be patterned. In this issue are given the brief report of the railroad commissioners and the presentment of the grand jury.

No suggestion of a startling character is to be found in either report. The former body recommends the adoption of some method of paying conductors and motormen—just what is not explained—so that they may not be tempted to run cars at too high speed to make up time, and after expressing its lack of confidence in the fenders now in use in Brooklyn, which no one regards with favor, urges compliance with rules that it has already promulgated as calculated greatly to decrease accidents. The grand jury is very indefinite in its suggestions; it wants something done, just what it does not know, so it simply urges the legislature to all in its power to secure the "passage of laws that will give safety on our streets." It recommends that a device for indicating speed be placed in cars, although nothing practicable of this kind seems to be available. The presentment cannot be regarded as a valuable contribution to the vast accumulation of reports relating to the operation of cars on the Brooklyn roads.

Montreal Street Railway Convention. The executive committee of the American Street Railway Association has begun its preparations for the convention to be held in Montreal in October next. The plans are as yet incomplete, so that little news concerning the programme is obtainable, but the committee is authority for the announcement that the meeting will be one of great interest. Some of the arrangements for the meeting are excellent. The selection of the Windsor Hotel as a headquarters for the association provides a convenient convention hall located in the hotel itself, and the Victoria Rink, which has been engaged for an exhibit hall, is only a step away. The expenses attending the exhibit of street railway apparatus and supplies will be no greater than in the case of conventions held in the United States. The exhibitor will, as heretofore, pay for the freight, cartage and floor space in the exhibit hall, but the expenses incident to entering the goods will be borne by the association. In making its arrangements for the convention we trust that the committee has impressed upon the Montreal gentlemen who will have charge of the preliminaries, the fact that the association conventions are largely attended and that ample and comfortable hotel accommodations must be provided. At the time the Electric Light Association held its convention in Montreal a few years ago, the provision in this respect was woefully inadequate and the meagerness of accommodation has not yet been forgotten. If the Electric Light Convention could not be properly looked out for, what will be the result when the street railway men, numbering three times as many visitors, reach the city, unless special provision is made for their accommodation? However this may be, there is no sort of doubt about the cordiality of welcome that will be extended to the delegates and those in attendance at the meeting by the residents of Montreal. They are wonderfully proud of their city, which now can boast of fine street railway facilities, and they are proverbially hospitable to visitors.

MONTREAL STREET RAILWAY CONVENTION.

The executive committee of the American Street Railway Association met last week in Montreal and many matters relating to the next convention, which will be held in that city in October next, were considered. It is understood that several papers of an interesting character have already been secured, but as the programme has not yet been entirely completed, the committee is not ready to make any announcement. The headquarters of the Association will be at the Windsor Hotel, and the sessions will be held in Windsor Hall, which is located in that building. The exhibit of street railway apparatus and supplies will be located in Victoria Rink, which is at the rear of the hotel. There is an abundance of room in this building, and it is believed that an excellent exhibit will be arranged. It is announced that all goods intended for exhibit will be entered and returned free to the exhibitor, except the charges for freight, drayage and floor space. The association will pay the entry fees. Judging from what the members of the committee have to say regarding the meeting, the Montreal convention should be an extremely enjoyable and profitable gathering.

ELECTRICAL EQUIPMENT OF THE NANTASKET BEACH STEAM LINE.

President Charles P. Clark, of the New York, New Haven & Hartford Railroad Company, has written the following letter regarding the substitution of electric power for steam on the Nantasket Beach Railroad:

"The Nantasket Beach Railroad is a short branch line, about seven miles in length, perfectly level, and reasonably straight, and is used principally in the summer business, which varies with the weather and with the season. The transportation problem is somewhat complicated by the fact that from one end of this branch are received large excursion trains almost daily in July and August, and from the other end large crowds who come down from Boston by boat and land at Pemberton. The business derived from these two terminals of the branch line is supplemented by a considerable amount of short riding, for the sake of riding along the beach. Occasionally an additional draft is made upon the railroad by reason of fog when the boats that come from Boston are unable to return, and 5,000 or 10,000 people have to be carried by rail to the city on short notice.

"The situation of this branch is exceptionally favorable as a place for experimenting as to the use of electricity as a motive power, and the company is now engaged in fitting up this seven miles for electrical use. We have contracted for two Green engines, each 820 nominal horse power, and for eight horizontal tubular boilers with return flue; two direct-coupled generators, 500 kilowatts each, made by the General Electric Company. We propose to use a 0000 copper trolley wire with naked feed wires carried upon iron arms bolted to Southern pine poles, 30 feet in length, 12 by 14 inches at the bottom and 10 by 12 inches at the top. These poles are to be located between the tracks, which are being laid to 13 feet centers. The electrical equipment is to be made interchangeable with our standard cars, and at first will consist of six motor cars, two motors to each car of 100 horse-power nominal capacity. These are expected to draw with ease a trailer car. Both these motor and trailer cars are 50 feet in length, open, and lighted with electricity, and entered from the side. In addition to this we are preparing four baggage cars, 30 feet in length, of which two are to be fitted with two motors each and two with four motors each, all of the General Electric Company's construction. By loading these baggage cars and so increasing their tractive force we expect to determine the efficiency of special motors. This is the extent to which this company expects to go at present, but from the experience derived during this summer (for the road is contracted to be in working order some time in the month of May) we shall be able to determine upon what other branches, or parts, of our system transference of steam power by the electric current may prove efficient and economical.

"In discussing the subject with various electrical engineers and companies we find that we are working in a somewhat unknown field, and must proceed cautiously, although the physical condition and grades of this branch line, the nature and volume of the travel over it, and its use in summer only make it less of an experiment than to equip graded, hilly, all-the-year-round roads, on which the traffic is limited."

TROLLEY MAIL SERVICE.

The trolley mail service will soon be introduced in Philadelphia, and the first road on which mail will be carried will probably be the Germantown Avenue line of the People's Traction Company. This line passes the sub-stations in Nicetown, Germantown, Mt. Airy and Chestnut Hill. While one line only will be used at first, it is the intention to develop eventually a somewhat extensive system. Postmaster Carr has given the subject considerable attention, and has received reports from the superintendents of each sub-station as to the availability of using the trolley lines for carrying the mails, but it has not been found easy to lay out a general system. On most of the streets, on account of their narrowness, but a single track is laid, and while cars may pass by the doors of three or four sub-stations, the return track of the same route is perhaps two or three squares away from the same stations. Postmaster Carr favors the use of a regular mail car similar to that in service in Brooklyn, on which mail may be distributed.

Experiments are in progress in Boston to determine whether any advantage would follow the utilizing of the trolley lines of the West End Company for the distribution of the mails.

NEW YORK RAILROAD COMMISSIONERS' REPORT.

The New York Board of Railroad Commissioners recently investigated the accidents caused by electric cars in Brooklyn, and its report has just been made public. The board has little to suggest beyond a recommendation of its old rules, with which street railway companies are urged to comply These recommendations to which the board refers in the following reports are the familiar suggestions contained in the reports of 1894.

After a careful examination of the facts, and after several hearings and personal inspections of the method of operation on the various lines of road, the Board renews its recommendations made in December, 1893, and published in its annual report for that year and republished in the report of 1894, a copy of the same being hereto annexed. From the investigation and the nature of the accidents the Board is confident that if such recommendations had been adopted by the companies and the suggestions then made had been conscientiously carried out most of the accidents would have been avoided.

The Board is confirmed in its adherence to the recommendations referred to by the fact that an advisory committee, appointed by the mayor of Brooklyn, has recently examined the subject, and in its report has adopted and renewed the main recommendations heretofore made by the Board, as stated.

In addition to such recommendations and suggestions, heretofore made, the Board further recommends that the method of payment of the motormen and conductors shall be such as to, in no event, tend to cause employees to attempt to make up time by running at an excessive rate of speed. Ordinances should also be enacted by the common council, and enforced by the police authorities, regulating the speed of cars, and the obstruction of tracks by vehicles. The pavements between the rails should also be so maintained as to cause as slight interference as possible with the fenders of the cars. To be of any value, the fender must be close to the rail. The Board is of the opinion that the fenders, now in use in said city, are of little or no practical use. Forms of apparatus have been described before the Board, which seem to solve the problem of regulating the speed of cars. If it can be demonstrated, by practical operation, that such devices will do what is claimed for them, the Board most earnestly recommends the adoption of one by the various companies in the city of Brooklyn. Opportunity to make the tests necessary should immediately be given by the railroads in question.

MUNICIPAL OWNERSHIP OF STREET RAILWAYS.

A mass meeting was held in Brooklyn last week to awaken an interest in the municipal ownership of street railways. Resolutions were adopted denouncing corporations and endorsing the bill of State Senator Bradley, now before the legislature, providing for the submission to the people of the question of municipal ownership. Among those present who participated in the meeting were Thomas G. Shearman, of New York; Rev. Father Ducey, of New York; Rev. Dr. Rainsford, of New York, and several labor leaders. Dr. Lyman Abbott, of Plymouth Church, sent a letter which is interesting, even if the views that he entertains do not commend themselves to street railway men:

A public engagement, made several months ago, prevents me from attending the meeting of February 28, in support of the proposed bill permitting municipal ownership of street railways. With the details of that bill I am not familiar, but I heartily approve the fundamental principle involved in the municipal ownership of street railways, namely: The public highways should be under the control of the public.

Formerly, in the country districts, the highways were subject to private control; the traveler paid toll at various points along the road, and the lessees of the franchise took the toll and were supposed to keep the turnpike in order.

This relic of the past age, abandoned in the country, survives in the city, where we give over a considerable portion of our highways to private corporations, giving them the profit of the toll and trusting them to provide the public with the necessary conveniences of transportation.

In this respect the rural communities are in advance of the municipalities, and the sooner the cities follow the example of the country and take their highways under their control the better.

This, it is true, might be done by other methods than by municipal ownership. But to put the street railroads under the control of public officials, while the roads are still owned by private corporations and operated for private profit, would certainly involve serious complications and would probably involve corruption even greater than that under the present system. The more radical method--municipal ownership—is simpler and more self-consistent.

The objection that municipal ownership is socialistic is not well founded. The proposal of socialism to put all industries under public control is best met, not by denying all possibility of cooperation in public enterprises, but by carefully discriminating between private and public functions, and surely the control of the public highways is a public function.

The objection that municipal ownership of street railways will lead to corruption is answered by a consideration of the fact that corruption is greatest where a public function is relegated to a private corporation. For in such cases the corporation is under constant temptation to obtain by corrupt methods special favors from the government and corrupt men in the government are tempted to extort money from the corporation as a condition of treating them with simple justice.

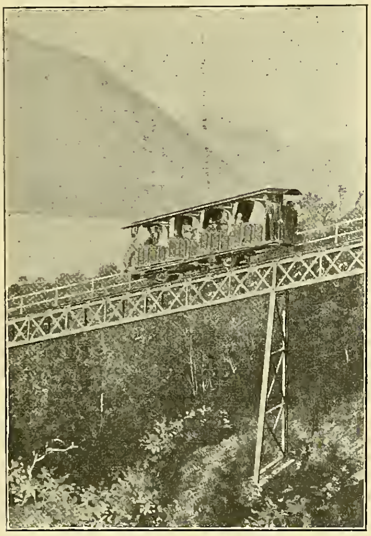
The objection that municipal ownership of street railways is an impossible dream of impracticable visionaries is answered by the experience of Great Britain, especially in Birmingham, Manchester and Glasgow, in which cities, as a result of municipal ownership, the service have been improved, the hours of the employees reduced and the profits to the municipality have not only paid the interest on the cost of the purchase, but, in at least one case, have repaid the purchase money in less than a quarter of a century.

Finally, it is asked, "How can Brooklyn, after having given away its streets to private corporations, resume control of them again?" The answer is that it is not necessary at this point in the discussion to formulate any method.

Let the public once determine that it ought to control its highways and we may be very sure that wise and honorable business men will find a way by which that control can be resumed, without disregarding the rights of private property on the one hand, or sacrificing the public welfare on the other.

MONTE SALVATORE ELECTRIC CABLE RAILWAY.

The accompanying cuts illustrate the Monte Salvatore electric cable railway in Switzerland, which was constructed for the purpose of facilitating the ascent of Monte Salvatore. While the road is an interesting one, its length is slightly less than a mile, measured horizontally; it is a trifle over a mile, measured obliquely, on the gradients. Owing to the inequalities of the grades, it is divided into two sections of about equal length, but one only continuous cable is used. Starting from the Paradiso steamboat station, at Lugano, the railway runs up the slope in a straight line crossing the St. Gothard Railway by an iron viaduct until it reaches the intermediate and motor station of Pazzalo, whence the second section ascends the mountain first by two reverse curves of 984 and 1312 feet radius and then in a straight line to the summit, with a full view of the lake throughout its entire length. It is constructed on the metre (3.28 ft.) gauge, but as a single line throughout the intermediate station replacing the crossing.


Monte Salvatore Electric Cable Railway.

In order to adapt the line as much as possible to the configuration of the ground, and thus save the cost of considerable works of art and earthworks, the lower section is comparatively flat, the initial gradient at the base being 17 per cent., with a gradual increase to 38 per cent. at the intermediate station, while from the latter to the summit the gradient rapidly increases from 38 to 60 per cent. The altitudes of the lower, intermediate and summit stations are, respectively, 925 ft., 1,634 ft. and 2,897 ft. above sea level, the total rise being, therefore, 1,972 ft., and the mean grade 40 per cent.

Besides an iron viaduct of two openings, 52 ft. each, over the St. Gothard Railway, and another iron viaduct of six openings of the same span over a ravine in the upper section, there was a considerable amount of limestone excavation, more especially near the summit. The viaduct and the rock cutting are shown in the views, Figs. 1 and 2. The formation level forms a solid cement masonry bed, with lateral steps and refuges cut into the rock on both sides of the upper section for the men inspecting or repairing the line when cars are passing.

The arrangement of the fastenings and of the double Abt rack bars is precisely the same as on the Burgenstock line, except that lighter rails and somewhat heavier angle-iron sleepers are used, and that iron anchors, or creep arresters, bolted to every fourth sleeper, are imbedded into the cement masonry foundation.

The cable with hemp core is of the cross-wound, Lang's patent, construction, and is composed of six strands of 15 wires each, varying in diameter from 1.8 to 2.3 millimetres. The diameter of the cable is 3.2 centimetres (2.26 in.), its weight 6.8 lbs. per yard, and its tested tensile strength 54 tons. The maximum car-load being 6.7 tons, the cable weight per section 2.4 tons and the maximum gradient 60 per cent., the greatest strain on the cable is 5.4 tons, or one-tenth of its breaking strength.

The intermediate and electric motor station is located at Lugano. On arriving there passengers alight and change into the car of the upper section, which stops exactly opposite the other on the same roofed platform. The arrangement of the motors, belting, bevel and spur gearing, as well as the automatic centrifugal brake, the hand brake and the friction coupling, and the working of the motors and drums at the regulation cable speed of one metre per second, is the same as in the Burgenstock line. The Salvatore station is provided with a reserve 50 H. P. semi-fixed steam engine, making 130 revolutions per minute, in case of the electric motive power failing through accident or want of water power, the latter case happening occasionally in winter at the summit the cable passes over a winding drum 11.5 feet and two intermediate guide pulleys 6.6 ft. in diameter.

The motors that operate the cable winding machinery derive current from a water power station five miles distant which supplies power not only to the railway but to a mill and for lighting the towns of Lugano and Capolago. The water power available is about 1,300 H. P, or at an efficiency of 80 per cent., 1,070 H. P. on the high pressure turbine shafts.

In the station there are in service two 225 H. P, turbines driving direct two sets of alternators, each of a capacity of 170 kilowatts, 600 revolutions and 2,200 volts; a 120 H. P. turbine driving direct two 60 H. P. continuous current Brown dynamos of 750 revolutions and 1,800 and 900 volts respectively, the former supplying the railway and the latter a mill. All the turbines are of the high pressure type. A fourth 500 H. P. turbine, with two 5,000 volt alternators for power transmission, is now in course of installation. All the dynamos can be coupled to a central counter shaft driven by belt from a reserve steam engine.

The high tension transmission to the Salvatore motor station consists of two five-millimeter copper wires, the loss being about 12 per cent. The motors are of the same (Brown's) type as the generators. The motive power required on the line is 40 H. P. The loss due to gearing and friction is, therefore, 17 per cent., and the total efficiency in respect of the 60 H. P. generator is 66.6 per cent. The figures of the cost of construction are given as follows: Works, buildings and line, $115,000 per mile; cable, motors and rolling stock, $6.200; furniture, tools and sundries, $500; total, $121,700.

The line was opened in 1890, and owing to the mild climate it is worked both summer and winter. The working staff consists of two mechanics, two drivers. two guards and two watchmen. The charge for electric power 60 H. P. is $25 per H. P. per annum. The extra cost of working the steam engine in case of insufficient electric power is defrayed by the contractors. The passengers carried average 24,000, the car miles 4370 miles per annum and the fare is 80 cents for the round trip. The net receipts are equal to 2.5 per cent. on the cost. The illustrations are reproduced from *Engineering*, London.

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OPINION OF A PRACTICAL MAN.

A reader of the STREET RAILWAY GAZETTE who served as a motorman for several years, filled the position of motor inspector and has had a wide practical experience, writes as follows regarding Nelson W. Perry's book on "Electric Motors: Their Construction, Operation and Maintenance."

It is unquestionably the best book obtainable for motormen, or, in fact, for practical men generally. I can safely say that the number of motormen who could profit by it is by no means small. During the last few months I have frequently had occasion to ride over one of the ——— electric lines. On a number of trips when the track was slippery I have seen the motorman lock his wheels, and then because the car did not stop throw the reverse lever and turn the current into the motors, which could not, of course, move. The result was the car skidded along for nearly a block. Times without number I have seen motormen throw on the entire current in less than 20 feet, with the result that the car would run from 900 to 1,000 feet before getting under full headway. I have counted the poles, so it is not guess work. If the men studied Mr. Perry's book incidents of this kind would be far more uncommon.

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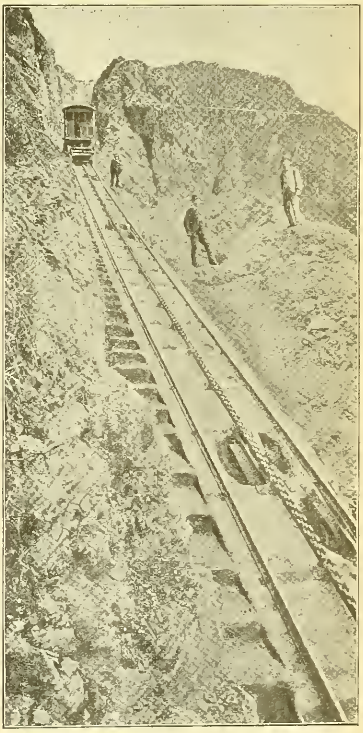
BROOKLYN ELECTRIC RAILWAYS CONSIDERED BY THE GRAND JURY.

The presentment of the Grand Jury in Brooklyn last week is devoted almost exclusively to matters relating to the local electric railways and the recent strike. In the course of this document the grand jury says:

"That there have been numerous cases of intimidation on the part of the strikers toward those who desired to work, we have no doubt; but from the nature of the circumstances it has been extremely difficult, and in most cases absolutely impossible, to procure information sufficient for indictment. Necessarily, one of the first things to determine was the origin of the strike. In this matter every endeavor has been made to get at the bottom facts, believing that if the causes could be discovered some remedial measures might be taken to obviate a repetition of the trouble. The indictment of the officials of one of the railroads for violation of the law in regard to hours of labor shows our judgment in the matter, and there is no room to doubt that the difference between the railroad companies and their employees in construing the ten-hour law was the primal cause of the trouble. The district attorney should press these indictments to as speedy an issue as possible as the final action of the courts in the matter will be of vital importance. We have given most painstaking consideration to all questions regarding the management of trolley roads, bearing in mind the rights of the companies, the necessities of their patrons and the best interests of the public generally. The question of speed, above all, seemed to demand our attention.


Monte Salvatore Electric Cable Railway.

"There have come to our notice many cases of accident, the evidence connected with which has been thoroughly sifted. We have had before us many persons who claimed that the trolley roads have been run at dangerous rates of speed; among others a prominent and well known scientist, whose statements are worthy of the highest respect and whose investigations were made solely from a sense of public duty. In several specific instances evidence was forthcoming to show that cars had been run at a speed ranging from 12 to 18 miles per hour. It was not necessary, however, to follow this matter, finding ourselves powerless to act, there being neither state law nor city ordinances to cover the points in question. It was our intention to probe this matter exhaustively, but the corporation counsel informed us that the city ordinances were in such a 'confused, uncertain and chaotic' condition regarding it that we were reluctantly compelled to desist from further investigation. He further informed us that he had drafted a bill for submission to the Legislature which would supply this lamentable omission, and expressed great regret at not being able to proceed against the offending roads. The corporation counsel has no systematic method of looking after violations of city ordinances. It has not been his custom to prosecute offenders against them. We, therefore, recommend that his office be so reorganized that it shall contain a special ordinance bureau, whose duty it shall be to see that the ordinances are observed, and that all violations thereof are punished. This is of the utmost importance, in view of the probability of legislation in the near future to regulate the speed of trolley cars.

"Investigation has shown the imperative necessity of some prompt legislative action for the regulation of the speed of trolleys with penalties severe enough to be absolutely deterrent of the mismanagement that leads to these shocking and harrowing accidents. And we earnestly request our representatives in Albany to do all in their power to secure the passage of laws that will give safety on our streets. The accidents have almost all occurred in the older and more thickly populated parts of the city. We, therefore, suggest that eight miles per hour should be the highest legal rate of speed permitted there, while in the newer and more sparsely settled districts the limit should be placed at ten to twelve miles. This recommendation is based upon the facts as shown by the testimony which has come before us.

"In order that passengers should be aware of the rate of speed at which they are traveling it is suggested that some apparatus be employed to register and exhibit the same. We also recommend that the penalty for tampering in any manner with the apparatus for the purpose of deceiving the public be punishable by imprisonment. Experience has proved that railway appliances can be relied upon only after they have stood the most severe practical tests. For this reason we consider it sufficient to express the hope that the railroad companies may discover some danger saving appliances that have stood such tests. We are, however, emphatically opposed to having the use of fenders or other appliances, whether approved by experience or not, absolve the railroad companies from criminal or civil liability in case of accident. Indeed, the number of suits and already accrued damages against the railroad companies on account of accidents must be to them the greatest incentive to provide themselves with accident and life-saving appliances. The matter of the quick stopping of cars in case of accidents has also received attention. The mechanical means, such as brakes, now used on the cars for this purpose, are as good as any that can be had. But it is evident that some of the accidents could have been avoided if there had been on the cars a chute filled with sand and worked by a simple lever. This device could be constructed and applied without difficulty and would always be ready for use in case of sudden need. This appears to us an indispensable addition to the means employed by railroads for sanding the track, because with the quick changes of our climate it is impossible to have the entire track of any system of railroads sanded at once, while if the motorman had at his immediate command this additional means to avert accident the danger would be greatly lessened. We recommend the exclusion of all passengers from the front platform of cars. Regarding the responsibility for accidents it is suggested that when they occur through no fault of the employees, but through the dereliction of the companies in providing weak, defective, poorly constructed or untrustworthy appliances, the railroad officials who have the direct supervision of such matters be held criminally responsible. The fixing of responsibility for accidents is a matter that should be clearly stated and defined.

"The trolley system as a factor in the present and future expansion of our city are fully and duly appreciated by everyone; but, in view of the fact that valuable franchises have been granted to corporations for the erection of elevated railroads to provide rapid transit, there is no valid reason why the trolley roads in their efforts to compete with the elevated roads in speed should be allowed to endanger the lives of our citizens, particularly as these roads are also owners of valuable franchises, for which the city has not received, and does not now receive, a recompense commensurate with their value. It is our firm conviction that in a matter of such paramount importance, where human life is at stake, a proper safeguard should be guaranteed to the public by the employment of none but competent motormen. We, therefore, recommend that it be made illegal to employ any but licensed motormen, and that licenses be issued only to candidates who have passed a thorough examination and demonstrated their ability to safely run a car; and a board of examiners should be appointed for the special purpose of examining and licensing motormen."

NEW YORK RAPID TRANSIT.

The New York Rapid Transit Commission held an important meeting last Wednesday. The board disposed of matters relating to routes and general plans of construction and arranged for further legislation to advance its work. The great difficulty with which the board has had to contend has been with that portion of the proposed road below Fourteenth street. It is now proposed to surmount this by causing the city to acquire the right to use the sidewalk vaults in Broadway for pipe lines for water, gas and other purposes, thus rendering possible the construction of a road with four tracks on the same level as near as possible to the surface of the street. This will involve an additional expense estimated at $5,000,000, which it is proposed shall be borne by the city, and an effort will be immediately made to induce the Legislature to make the necessary appropriation. The general plan of construction that was adopted was as follows:

The general plan of construction of the loop under Battery Park, State and Whitehall streets and the loop around City Hall Park shall require two tracks, and from the junction near Battery Place to near Vesey street two parallel tracks, to be located one on each side of the centre of the street, and so constructed that two additional tracks can be added at some future time in case of need, all on the same level as near as may be, with suitable switches and connections between them; and from Vesey street to Fourteenth street, and from Fourteenth street to 135th street on the west side line shall require four parallel tracks as near as may be on the same level, and from 135th street to 185th street on the west side line shall require two parallel tracks, and so placed that two additional tracks can be added at some future time in case of need, all to be on the same level as near as may be. On the east side line from Fourteenth street to Forty-fourth street it shall require four parallel tracks as near as may be on the same level, and from Forty-fourth street to 146th street and Walton avenue two parallel tracks as near as may be on the same level.

The general plan of construction shall require three side tracks on the same level under Park row, connecting with the loop around City Hall Park, and also with the line under Broadway, at or near Fulton street, and shall require additional side tracks at Battery Park, City Hall Park, Union Square and at such other points as the operation of the road may demand.

The tunnels shall not be less than 12 feet in height in the clear, and shall be 12½ feet in width for each track, except that at unusually narrow places, such as on Broadway, between Eighteenth and Twenty-first streets, and between Twenty-sixth and Thirty-third streets, the width for each track may be reduced to any extent which shall leave the width not less than 11 feet. Viaducts shall be built with a width of 12½ feet for each track, and with footwalks on the outside in addition, three feet in width for each.

The tunnels and viaducts shall be so located that their center line shall coincide as near as may be with the center line of the street.

Provision shall be made for the placing of pipes, wires, sewers and other subsurface structures in suitable galleries either at the side or beneath the tracks, or both, such galleries to be so arranged as to give free access for the repairing or altering of existing structures, or for the placing of new structures, and for making connections between the same and the houses at any time without disturbing the surface of the street. Wherever galleries are placed at the sides of the tunnel they shall not, in connection with the railway, occupy a greater width between houses than 70 feet, and in no place shall they come nearer than 5 feet from the house line.

Whenever necessary for the proper support of the street surface, the roof the tunnel shall be of iron or steel girders, with brick or concrete arches between, supported by suitable iron or steel columns and masonry walls, or it shall be a masonry arch.

The roof of the tunnel shall be as near the surface of the street as street conditions and grades will permit. Viaducts shall be of iron or steel and masonry, or both combined. The Harlem river shall be crossed by a double-track drawbridge not less than 24 feet in the clear above mean high water mark, with clear spans of not less than 100 feet between the centre pier and bulkhead lines measured at right angles to the latter.

The junction of the tracks near Fourteenth street shall be effected by dividing them under Union Square, raising one pair and depressing the other, so that trains going in the opposite directions shall not cross on the same level.

All station approaches shall be as far as possible at the intersection of streets, except that on the Boulevard station approaches may be in the centre of the street.

Footways between all the tracks shall be provided the whole length of the line, and refuge niches shall be built in the side walls at proper intervals for the convenience and protection of employees.

The general mode of operation shall be by electricity or some other power not requiring combustion within the tunnels or on the viaducts, and the motors shall be capable of moving trains at a speed of not less than 40 miles per hour for long distances, exclusive of stops.

The manner of construction from South Ferry to about Thirty-fourth street on the west side shall be by underground tunnelling. The excavations below Morris street, in the neighborhood of Canal street, and at such other points as this Commission may determine, may be made from the street surface, and all excavations on the west side line above Thirty-fourth street and on the east side line above Fourteenth street may be made from the street surface, provided that on Broadway below Thirty-fourth street no excavation except at Canal street shall disturb more than one-half of the street surface at one time, nor except at Canal street shall any opening exceed 200 ft. in length. No two openings shall be within less than 500 ft. from each other. Every opening shall be bridged, so as to provide for the street traffic.

POWER STATION AND OFFICE OF THE CHICAGO & NORTH SHORE RAILWAY BURNED.

The power house and offices of the Chicago & North Shore Electric Railway Company, at Edgewater, a suburb of Chicago, were destroyed by fire last Monday. The machinery and most of the motor cars were burned. The loss is estimated at $150,000.

The building was a two-story structure and was erected about two years ago. It formed a long block on Evanston avenue and contained the power house, car barns, repair shops and offices.

The two engines in the power station, which were the Wheelock type, drove multipolar generators made by the General Electric Company. The boilers were of the Hawley down draft pattern. The company operated on its line 25 Pullman cars mounted on McGuire trucks.

RAIL-BONDING, AND ITS BEARING ON ELECTROLYTIC CORROSION.*

BY GEORGE P. LOW.

II.

It is now clear that the deep rails being imbedded in a solid roadway enables the engineer to defy the forces of expansion in the rails; he therefore prepares the ends so that they closely abut, and then double bolts, rivets or welds the joints so as to make a practically continuous rail. In the case of a steel rail buried in the earth, the necessary expansion on account of increase of temperature consists of a minute enlargement of the sectional area, thus following the direction of least resistance. A fruitful source of trouble on street railroads has been the space unnecessarily left between the rail ends for expansion as practiced hitherto by steam roads. The wheels of electric motor cars and even cable cars soon pound these places sufficiently to cause considerable deflection. Another point which will assist in maintaining perfect steel lines for street railway traffic is to adopt the four-wheeled truck system, eight wheels under each car, the motor to be attached to the two axles nearest the center of the car. By this means, the forward wheels, being idlers, will carry forward the minute wave of depression to be further depressed by the driving wheel carrying the greatest weight. This will tend to preserve the perfect line.

In view of the numerous references at hand, one cannot question the fact that recent practices have made it possible to obviate two details of track construction that have hitherto been considered insurmountable in rendering rails electrically continuous, namely, extreme rigidity at rail joints and perfect control of the longitudinal expansion of rails. The art of street railway building having advanced sufficiently to enable the construction of mechanically perfect rail joints, the problem of using the rails exclusively for the return circuit may now be attacked without fear of failure from the difficulties attending either bonding or corrosive electrolysis. To comprehend the importance of the return circuit problem, it is instructive to carry out a line of reasoning that has appeared in a communication published in the *Street Railway Review*. "In steel rails," the article states, "it is usual to say that every 10 lbs. weight per yard means one square in. of cross-section. Four rails of 70 lbs. per yard = 28 square inches in sectiion = a steel bar 4 in. x 7 in. = a copper bar 1 in. x 5 in."

The conductivity of a copper bar having an area of 5 sqnare inches is equal to that of 38 No. 000 B. & S. wires. If, therefore, the four 70-lb. rails of a double-track system were electrically continuous and carried current at a density equivalent to 1000 amperes per square inch of copper, they would carry 5000 amperes a distance of one mile with a loss of but 88 volts, or less than 15 per cent. if the initial E.M.F. is 600 volts, or 16 per cent. if it is 550 volts, or 17·6 per cent. if it is 500 volts. This is a loss in potential of less than 1·8 volts or $\frac{36}{100}$ of one per cent. per 100 amperes per mile. The attainment of these results by the electric railways of the country would mean an annual saving of many thousands of dollars.

The communication referred to concludes by defining the following conditions as affording the best return circuit:

"1. Intrinsic resistance low enough to need no help from the earth.

"2. Utilization of rails as return conductors.

"3. Rail bonds of heaviest practicable size.

"4. Rail bonds of shortest possible length.

"5. Rail bonds protected against corrosion.

"6. An underground main or trunk return from the power-house to the track, and there connected with each line of rails, and low enough resistance to carry the maximum current with but slight drop in potential."

It will be conceded that these conditions are thoroughly comprehensive, and that their correctness is more apparent than is a means for their accomplishment, but to Mr. Frederick T. Newberry, a well known civil engineer of the Pacific Coast, is due the credit of devising a method of bonding that so completely satisfies every possible condition in a thoroughly practical way, that only in extraordinarily large systems will the trunk return be necessary. This method is termed "direct bonding," and in it the bond consists of merely a copper dowel that is shrunken-fit into holes drilled into the abutting rail ends. The bond is formed by reaming out holes in the ends of the rails, to be coupled one in the head and one or more in the bottom flange, as shown in Figs. 4 and 5. For a 70-pound rail the preferred diameter of the holes is $\frac{5}{16}$ inches. These holes are to be bored just before placing the rail, which is then heated by a gasoline torch, and a round bolt or dowel of pure soft copper, two inches long and slightly larger than $\frac{5}{16}$ inch in diameter, is driven in one rail. Then the abutting rail is forced upon the other end of the dowel, the faces of the rails being brought as closely together as possible. The fish-plates are then placed and double-bolted, riveted or welded together. The carrying capacity of these two dowels would be equal to one-half that of the rail, or equal to a bar of copper $\frac{1}{2}$ in. wide by $1\frac{1}{4}$ in. thick, which is amply sufficient to carry the return current of any road now in operation in this country. If it were found advisable to double this capacity, it would be done with three dowels, one of $\frac{7}{8}$ in. in diameter in the head, and two of $\frac{5}{8}$ in. in diameter in the bottom flange. The junction of the copper and steel in the interior of the rail is electrically perfect, and remains so as long as the rail continues in place. When the work is well done, no particle of copper will be exposed to any action from air, water, or other agencies, and being completely enveloped in the rail will be perfectly protected from fracture or harm of any kind.

The connecting surface of this bond is seven times its area, thereby affording the rail a carrying capacity at the point of bonding equal to that of the bond itself, and with rails 30 feet long, 352 joints per mile, 70 pounds of copper will be consumed in bonding a single-track mile. Experience proves that no great heating of the rail is required to effect an immovable grip on the copper dowel, which is polished and placed in the freshly bored hole in the rail end that has been heated at so low a temperature that there is not the slightest oxidation. Additional rigidity is secured by rendering the dowel ends slightly conical, so that they are upset in being driven home. A sectional view of the dowel bond is shown in Fig. 6, consisting of two cubes of steel, each $1\frac{1}{2}$ in. on the side into which a $\frac{5}{8}$ in. copper dowel has been shrunken-fit. It does not appear that a more perfect union could have been made even by welding. According to Crosby and Bell, the cost of single No. 0 bonding is $600 per mile, viz., $400 for material and $200 for labor per mile of single track. The cost per mile for boring and setting direct bonding having a carrying capacity of 600 amperes is estimated at $150. Adding a royalty of 50 cents per joint, makes a total cost of $326 per mile of single track, while with $\frac{23}{32}$ in. dowels having a carrying capacity of 800 amperes, the total cost is estimated to be $400 per mile. Among the advantages of direct bonding will be enumerated:

1st. The practical elimination of the factor of length in bond wires.

2d. The use of bonds of maximum cross-section.

3d. Most perfect means available for effecting electrical contact between bonds and rails, hence

4th. Highest possible conductivity in bonding, and

5th. Absolute permanence.

6th. Perfect protection against water, acids, alkalies, gas, atmospheric or other corrosive influences.

7th. Minimum consumption of copper in bond wires (approximately 70 lbs. per mile at 15 cents per lb., $10.50).

8th. Carrying capacity limited only by that of the rail.

9th. No cross track bonding.

10th. No supplementary bonding.

11th. No rivets, solder, paint, screws, bolts or channel pins.

12th. No. electrolysis.

13th. Practical equivalent of welded rails from almost every standpoint.

14th. Easily attached to finished systems at a

15th. Cost not exceeding that of present methods of bonding, and at a

16th. Cost far less than that of welded rails.

A marked peculiarity in the operation of electric roads consists in the fact that for the same results in foot-pounds, electric roads require more than twice the boiler and engine duty that is necessary on steam roads. A brochure recently issued by a leading electric company states that although a ton weight may be moved on steam roads by an expenditure of force equal to a pull of eight pounds, which is the usual estimate, yet electric roads require for the same duty a steam and electric plant capable of exacting an effort of 30 pounds, this despite the fact that the line of track of a well-built electric road is far superior to that of steam roads in the true, even and immobile character of the rail surface. A perfect system of rail-bonding will effect an increase in efficiency of an electric road by various degrees of from 5 per cent. to 20 per cent., and the writer knows of at least one instance wherein perfect bonding would increase the efficiency of that particular system by not less than 25 per cent. It must be conceded, therefore, that a very material part of this extraordinary loss will be obviated by perfect rail-bonding.

A prevailing practice, that might in generosity be termed an inconsistency, is that of bonding a wire to the web of a rail and then rating the carrying capacity of the bond as that of the wire. This fact suggests a criticism. A No. 0 B. & S. wire, for instance, has a circumference of 1.021 in., while the web of a rail is generally .375 in. in thickness. This multiplied by 1.021 and divided by 5.63 gives the carrying capacity of the rail surface exposed to the bond wire as the equivalent of a copper wire having an area of 0.68 square inches, or about 82 per cent. of the conductivity of the No. 0 bond. Under these generally prevailing conditions, the carrying capacity of such bonding is overestimated by about 20 per cent. To enable the copper bond to take a volume of current up to its full capacity, its surface contact with the rail must be roughly six times the area of the wire. It is obvious, therefere, that the web of the rail is not the proper place to attach bond wires.

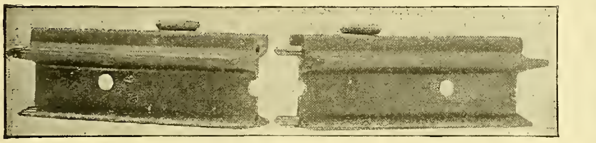


FIG. 4.

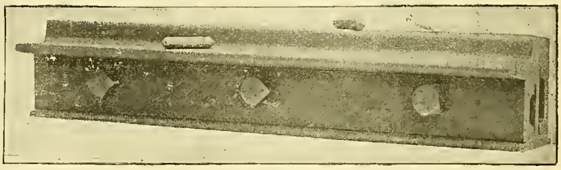


FIG. 5.

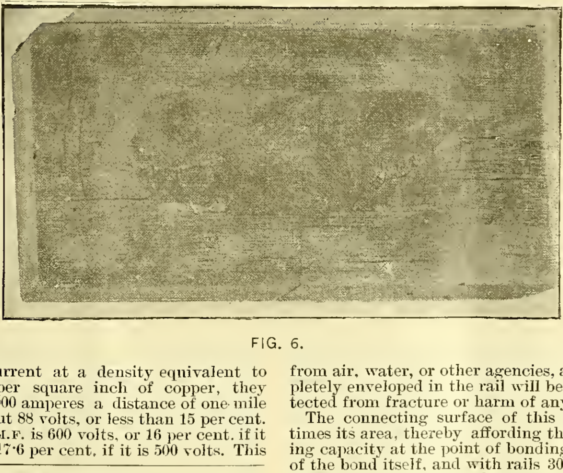


FIG. 6.

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* A Communication in Discussion of a Paper, by Isaiah H. Farnham, on the Destructive Effect of Electrical Currents on Subterranean Pipes, read before the American Institute of Electrical Engineers, April 18th and 25th, 1894. See STREET RAILWAY GAZETTE, April 21, 1894.

To illustrate: The *Street Railway Journal* for January, 1894, contains this statement regarding the bonding of rails on the lines of the Electric Traction Company of Philadelphia:

"A bare copper No. 00 wire is used for electrically connecting the rails. This is laced in and out of the adjoining ends outside of the angle bars (fish-plates) three times, so that the carrying capacity of the bonds at each joint is three times that of a single No. 00 wire, and is equal to that of a 90-pound girder rail of the Pennsylvania Steel Company."

The fact is, then, that the rails are triple lace, bonded through the web with No. 00 wire. The bond wires alone have a carrying capacity of 652 amperes at 122° F., but as they (being laced) make contact with the rails only by means of two holes in the web, the actual surface of steel exposed to the copper wire is but .859 square inches, whereas it should be at least 1.765 square inches to obtain the full carrying capacity of the three No. 00 wires used. From this it is evident that the bond will carry but one-half the current claimed, but after theory and practice have compromised the case, it may be found that the duty actually performed will approach the designed duty to within 20 per cent. or 25 per cent. This will reduce the advisable carrying capacity of the rail bond to less than 500 amperes. Again, the statement quoted claims that the carrying capacity of the bonding is equal to that of a 90-pound rail. The carrying capacity of a 90-pound rail is approximately 1500 amperes, against which 500 ampere bonding appears small, particularly in a system proposing to consume 10,000 horse-power. As scores of smaller enterprises anxiously await the lead of the great companies and follow implicitly in the same path, too much caution in publishing such statements as that quoted can not be exercised.

In conclusion, the art of rail-bonding now appears to have been perfected, and the damage that has been caused by corrosive electrolysis may be attributed to defective bonding, for without doubt proper main-to-track, rail-to-rail, and track-to-dynamo bonding will cure the ill almost without exception. Should the street railway companies delay in correcting the evil it is probable that municipal authorities will take action for the protection of citizens in their vested interests, in which event the conditions now existing may be further and seriously complicated by ill-advised municipal exactions. The problem of eliminating electrolytic corrosion is, in brief, simply one of judicious bonding.

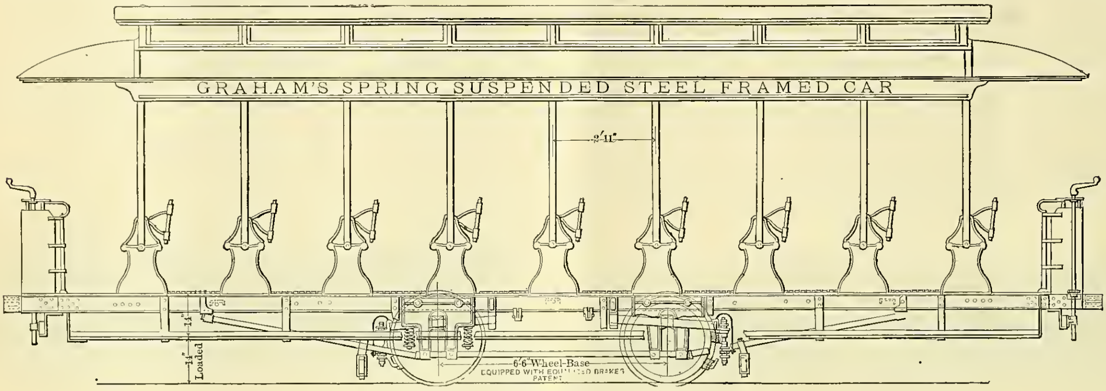
(CONCLUDED.)

GRAHAM STEEL FRAMED CAR.

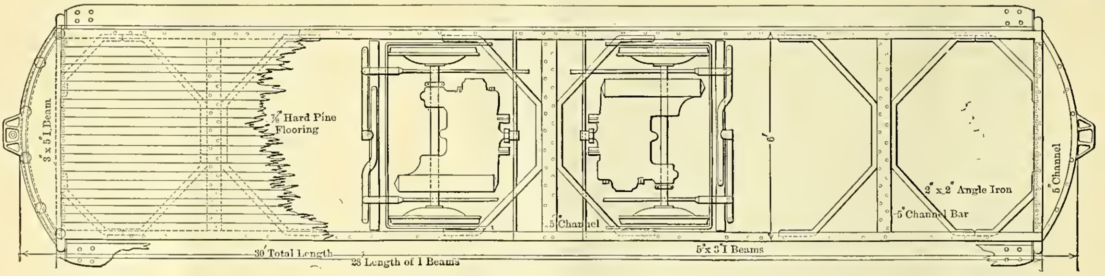
In the accompanying cuts are shown a plan and elevation of the Graham Equipment Company's new steel framed car, equipped with its equalized brakes with rubber suspension. The steel I-beam frame of the truck is extended 28 feet, which is the ordinary length of a 9 or 10 bench open car. It is framed and braced after the Graham Company's regular standard, and the company claims for the car simplicity, strength, lightness and cheapness. The floor is 8 inches lower than any other open car in service, and the car is much lighter complete with wheels than an open car without the truck. The I-beams have a coefficient of five tons at their extreme ends without the support of the truss. The company states that the wooden sills used in most open cars are 7½ inches by 4½ inches, and have no inherent strength to keep them from sagging; while they are 10 times heavier than the I-beam sill. The pedestals are made of pressed steel, and are in halves and are bolted to each side of the I-beam. When it is necessary to paint the car or take it into the wood shop for any repairs, it is only necessary to unbolt the pedestals, jack up the car and carry it away. The saving in trucks alone, it is stated, is an immense item. The steps to this car are 14 inches each from the rail.

Insurance companies insist that all cars stored in barns must have wheels under them. With the present method this necessitates a double equipment of trucks, which is a great burden to some railroads. The Graham Equipment Co. states that as it saves the company the expense of an extra truck its only extra investment is the wheels. When summer cars are stored for the winter old wheels can be put under them and they will always be ready to be pulled out, and in this way the spirit of the insurance laws can be conformed to.

The Graham Company makes interesting claims for the cheapness of the car as well as for its excellent riding qualities and the efficiency of its brakes. The car is manufactured by the Graham Equipment Company, of Providence, R. I.


GRAHAM'S SPRING SUSPENDED STEEL FRAMED CAR
2'11"
14"
14" Loaded
6'6" Wheel-Base
EQUIPPED WITH EQUALIZED BRAKES PATENT

GRAHAM STEEL FRAMED CAR.—Elevation.



GRAHAM STEEL FRAMED CAR.—Plan.

NCANDESCENT LAMP FIELD MADE FREE BY THE DECISION IN THE BATE REFRIGERATOR CASE.

The United States Supreme Court has handed down a decision in the famous Bate Refrigerator case, which has been awaited with the greatest interest by companies controlling inventions patented here and abroad. The court in this decision affirms that the date of issue and not the date of application controls in deciding the date of expiration of an American patent for an invention previously patented in a foreign country. It results from this decision that several electrical patents of the highest importance, including the Edison incandescent lamp patent, have expired. A summary of the statement of the facts and the opinion of the court is given herewith:

On Dec. 1, 1876, John J. Bate made application to the United States for letters patent for an improvement in processes for preserving meats during storage and transportation.

Pending this application two foreign patents were granted for the Bate invention—one, for the term of 14 years, by the British Government to William Robert Blake, on a communication from Bate, under date of Jan. 29, 1877, which patent was sealed July 13, 1877, and the complete specifications of which were filed July 26, 1877; the other, for the term of five years, by the Government of the Dominion of Canada to Bate himself, under date of Jan. 9, 1877.

After these foreign patents were issued, namely, on Nov. 20, 1877, Bate received a patent from the United States, expressed to be for the term of 17 years, and assigned it to the Bate Refrigerating Company, the plaintiff in this suit.

The present suit was brought by that company July 25, 1892, for an injunction against the infringement of the American patent, and also for an accounting. It was set down for hearing in the Circuit Court on pleas to the bill, and a decree was passed dismissing the suit. From that decree an appeal was taken to the Circuit Court of Appeals.

Both foreign patents for the Bate invention having expired before the expiration of 17 years specified in the United States patents, the following questions arose in and have been certified by the Circuit Court of Appeals: Whether the invention for which the patent from the United States was issued had been "previously patented in a foreign country," within the meaning of these words in

Section 4887 of the Revised Statutes; and whether the American patent expired under the terms of that section before the expiration of 17 years from its date.

The opinion was read by Justice Harlan. It reviewed all the legislation on the subject, discussed the meaning of Congress, as expressed in Section 4887, Revised Statutes, and concluded as follows:

"Our answer to the questions contained are that the invention for which United States patent to Bate was issued was, under the facts stated, 'previously patented in a foreign country' within the meaning of those words in Section 4887 of the Revised Statutes, and that the United States patent to him expired under the terms of that section before the expiration of 17 years from its date."

Presenting the views of the Court, which unanimously supported the decision, Justice Harlan set forth the position of the parties to the suit as follows:

"The plaintiff insists that under a proper construction of the statute an invention patented or caused to be patented in a foreign country before being patented in this country should not be deemed to have been 'previously patented in a foreign country' unless the foreign patent was issued prior to the application for the American patent. The defendants contend that the respective dates of the American and foreign patents, and not the date of the American application, determine the question whether an invention, patented here, has been 'previously patented in a foreign country.'"

The court then reviewed the history of legislation relating to patents. From this history it appeared to the court that in all the above acts Congress had in mind the date of an application for a patent, the date of the filing of specifications and the date of the patent.

That, under the act of 1836, a patent could not be granted if it appeared that the applicant was not the original and first inventor or discoverer, or that any part of that which was claimed as new had before been invented or discovered or patented or described in any foreign publication in use in this or any foreign country; yet an original and true inventor was not to be deprived of a patent for his invention "by reason of his having previously taken out letters patent therefor in a foreign country and the same having been published at any time within six months next preceding the filing of his specification and drawings."

That under the act of 1839 an inventor, whose invention had not been introduced into public and common use in the United States prior to the application for a patent, should not be debarred from receiving a patent by reason of his invention "having been patented in a foreign country more than six months prior to his application."

That under the act of 1870 an inventor, whose invention had not been introduced into public use in the United States for more than two years prior to the application, should not be debarred from receiving a patent by reason of its having been first patented or caused to be patented in a foreign country, these words not being qualified, as in the act of 1839, by any reference to the date of the application.

That when an American patent was granted, in conformity with the sixth section of the act of 1839, for an invention "patented in a foreign country more than six months prior to his application," it expired, in every case, at the end of 14 years "from the date or publication of such foreign letters patent"; and when, in conformity with the twenty-fifth section of the act of 1870, a patent was granted for an invention "first patented or caused to be patented in a foreign country," it expired "at the same time with the foreign patent, or, if there be more than one at the same time with the one having the shortest term."

That under the Revised Statutes, while a patent for an invention could not be withheld nor deemed invalid, "by reason of its having been first patented or caused to be patented in a foreign country, unless the same has been introduced into public use in the United States more than two years prior to the application," yet "every patent granted for an invention previously patented in a foreign country shall be so limited as to expire at the same time" with the one having the shortest term—in no case to remain in force longer than 17 years.

After an elaborate review of previous decisions the Court said:

"We are of opinion that Congress intended by the 25th section of the act of 1870, preserved in Section 4887 of the Revised Statutes, to introduce a new test in respect of the term of an American patent, where the same invention was the subject of a foreign patent first issued. It has already been observed that the statutes relating to patents show upon their face that Congress always had in mind the difference between an application for a patent and the patent itself. And that difference is apparent in the act of 1870.

"The act of 1870 provided for the case of an inventor whose invention had not been introduced into public use in the United States for more than two years prior to his application, but which had been 'first patented or caused to be patented in a foreign country.' In such a case that statute expressly provided that the American patent should expire with the foreign patent having the shortest term to run.

"The case provided for by Section 4887 of the Revised Statutes is the same as that provided for by the 25th section of the act of 1870, and the words 'first patented or caused to be patented in a foreign country' in the first clause of that section are emphasized by the words in the succeeding clause, 'previously patented' in a foreign country.

"We cannot superadd, in Section 4,887 of the Revised Statutes, the words 'prior to the application,' either after the words 'first patented or caused to be patented in a foreign country,' or after the words 'previously patented in a foreign country'; without defeating the intention of Congress as manifested by the language it selected to indicate its purpose. And the express command of the existing statute is that every American patent for an invention 'previously patented in a foreign country—that is, first patented or caused to be patented in a foreign country,' shall expire at the same time with the foreign patent. No words are used that will justify the Court in holding that an invention patented in a foreign country before being patented here is to be exempt from the operation of the provision limiting the term of the American patent to expire with the foreign patent.

"Was the Bate invention patented abroad before it was patented in this country? If so, the American patent expired with the foreign patent, and therefore the American public became entitled to use the invention from the time the foreign public were permitted to use it. Congress, in effect, by the existing law says to the inventor in order to enjoy the exclusive use in this country of his invention for the term prescribed by law 'if your invention has not been introduced into public use for more than two years, you may, upon complying with the condition prescribed, obtain an American patent, and you may, if you can, obtain a foreign patent. But the American patent will be granted on the condition that if you obtain a foreign patent first your invention shall be free to the American people whenever by reason of the expiration of the foreign patent it becomes free to people abroad; but in no case shall the term of the American patent exceed 17 years.' This we deem to be a sound interpretation of the statute giving to the words used the meaning required by their ordinary signification. In our judgment the language used is so plain and unambiguous that a refusal to recognize its natural meaning would be justly regarded as indicating a purpose to change the law by judicial action based upon the supposed policy of Congress. But as this court well said in Haddon vs. Collector, 5 Wall. 107: 'What is termed the policy of the Government with reference to any particular legislation is generally a very uncertain thing, upon which all sorts of opinions are founded by different persons It is a ground much too unstable upon which to rest the judgment of the court in the interpretation of statutes.' 'Where the language of the act is explicit' this court has said 'there is great danger in departing from the words used to give an effect to the law which may be supposed to be designed by the legislature.' * * * It is not for the court to say where the language of the statute is clear that it shall be so construed as to embrace cases because no good reason can be assigned why these were excepted from its provisions."

"Undoubtedly the court when endeavoring to ascertain the intention of the legislature may be justified under some circumstance in giving weight to considerations of injustice or inconvenience that may arise from a broad construction of the statutes. It is, therefore, said that the time ordinarily intervening in other countries between the filing of application and the granting of the patent is very short in comparison with the time ordinarily consumed in this country in obtaining a patent after the inventor has filed his application in the Patent Office, and consequently the statute, if considered as we have indicated these words, may operate greatly to the injury of the American inventor in that he will be deprived of so much of the statutory term of his American patent as will be in excess of the term of any foreign patents previously obtained upon the same invention. If the statute thus construed does not give to the inventor all the benefits he would like to have, the remedy is with another department of the government, and it is not for the courts to tamper with the words of the statute or put a strained construction on a legislative enactment whose language is clear and explicit to accomplish a result not contemplated by Congress. This court spoke by Chief Justice Marshall in United States *vs.* Fisher, that where the meaning of the legislature was plain it must be obeyed."

The Court then reviews the principle of limiting American patents to expire with previous foreign patents as it appears in the earlier acts. The Court then refers to the allegation that the United States promises an inventor 17 years' protection, provided it was found that he was so entitled to the same at the time of such application. But "if the promise to issue a patent is made with a reservation in the statute containing the promise that the patent when issued shall be limited to expire with any foreign patent previously issued for the same invention, then there is no basis for the suggestion that the enforcement of that condition violates any promise made to the inventor."

"We think that the words used in Section 4887 of the Revised Statutes, as well as those in Section 25 of the act of 1870 clearly evince the purpose of Congress to regulate the term of the American patent (where the same invention has been patented abroad) so that it will expire at the time the foreign patent expires, even if the latter was applied for and granted after the filing of the American application or before the American patent issues."

The Court then considered the contention regarding the proceedings in Congress relating to the bills which have numerous amendments, the act of 1870, and also the observations made by Mr. Jenckes when reporting that bill.

"These considerations, it is supposed, should have controlling weight in our interpretation of the act as finally passed. We cannot assent to this view. * * *"

A good deal has been said about the intention of Congress, as manifested by its legislation, to deal liberally with inventors, especially those who were citizens of the United States. This is true; but it is for Congress to prescribe the conditions upon which it will secure to inventors the exclusive right to his inventions. What may be due to inventors is a matter about which there may well exist differences of opinion. It is for the legislative branch of the government to say when a patent to the inventor shall expire, and, therefore, when the public may enjoy, without charge, the benefit of the invention covered by it. We can very well understand how the existing statute may, under some circumstances, operate injuriously to the inventor. He, in addition to exclusive rights granted to him in this country for the term of 17 years, wishes to secure a monopoly for his invention in other countries, and if he obtains foreign patents for the invention before obtaining one here, the American patent is limited by law, whether it is so expressed or not in the patent; it is to expire with the foreign patent of the shortest term. This is the case as it appears from the standpoint of the patentee without regard to the interests of the American public.

But is it to be remembered—at least it may be assumed that Congress so intended—that action by the Patent Office upon applications for patent was often unduly and purposely delayed by applicants until they could reap the full benefit of the monopoly by them in foreign countries before taking out an American patent? "In the mean time," the Commissioner of Patents in his annual report as late as 1887 said, that "they (applicants for American patents) are engaged in the manufacture and putting upon the market the article or improvements, but warning the public that the patent is applied for, the effect of which is to give them the absolute control and monopoly of the invention and to deter all other inventors from entering upon the same field of invention and from manufacturing the article." . . .

"If this apparently operates harshly upon inventors (the expiration of the American patent) it is for Congress, whose discretion is not subject to judicial control, to make provision for this, because, if it be possible to do so, such injury to the people of our country should not be inflicted upon them.

"And it may be said in this connection that Congress allowed the 25th section of the Act of 1870 to stand, although the Commissioner of Patents, immediately after the passage of that Act, ruled that it had changed the prior law so as to limit the American patent to expire at the same time with the foreign of the shortest term covering the same invention, and issued before the American patent, although after the application therefor was made. If, as is insisted, the change was not intended and was effected only by words carelessly used and not purposing to introduce a new rule for the limitation of the term of the American patent, some action on this subject, it may be assumed, would have been taken by Congress after the passage of the Act of 1870.

"The Revised Statutes of 1874 were adopted with the knowledge, it must be presumed, on the part of Congress of the construction previously placed by the Patent Office upon the 25th section of the Act of 1870. This presumption is strengthened by an examination of the Act, approved February 18, 1875, entitled 'an Act to correct errors and to supply omissions in the Revised Statutes.' That act upon its face shows that the revision of 1874 was carefully censidered after it was adopted for the purpose of ascertaining whether errors or omissions in the work of revision had been committed. Now, it is inconceivable that the addition in the wording of the 25th Section of the Act of 1870 or of Section 4887 of the Revised Statutes when compared with the Act of 1839 could have escaped the attention of Congress, especially as the Act of 1870 had been interpreted as introducing a new rule in respect to the term of American patents where the same invention was covered by a foreign patent previously issued. The Act of 1875 for the purpose of correcting errors and omissions amends nearly 70 sections of the Revised Statutes. But there is no alteration of Section 4887.

"Still further—as an examination of the statutes will show—since the Revised Statutes went into operation more than 750 sections other than those referred to in the Act of 1875 have been amended or repealed, but no amendment has been made to Section 4887.

"The rule prescribed by the 25th Section of the Act of 1870 having been reproduced in Section 4887 of the Revised Statutes, and the latter section never having been amended, we ought not after the lapse of nearly twenty-five years from the passage of the Act of 1870 place upon its 25th Section, or upon Section 4887 of Revised Statutes, which takes its place, an interpretation other than that which the ordinary natural meaning of their words import.

"Our answers, therefore, to the questions certified are, that the invention for which United States patent to Bate was issued under the facts stated, was 'previously patented in a foreign country,' within the meaning of those words in section 4887 of the Revised Statutes, and that the United States patent to him expired under the terms of that section before the expiration of 17 years from its date.

"Let it be so certified to the Circuit Court of Appeals."

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ELECTRIC LOCOMOTIVES.*

BY GEORGE J. VARNEY.

England was in advance in the use of electric locomotives for passenger traffic. They were first used on the City and South London Electrical Railway—an underground road—at its opening in November, 1890, 14 of the machines, weighing 10 tons each, being in readiness.

In America, electric locomotives, proper, were first used for haulage in mines, the earliest having been put into service in 1889. A mongrel machine, partly for carrying freight as well as for hauling freight-cars, had been put into service on the branch tracks of a manufactory in the previous year. The best example of this sort is the locomotive made for the Whitin Machine Works, Whitinsville, Mass., in 1891. Its one motor has a maximum of 100 horse-power, and its total weight is 43,000 pounds. The diameter of the driving-wheels is 42 inches; and the speed, when drawing a maximum load, is five miles an hour. About one-half the length of the floor is covered by a canopy. Its service is the hauling of freight-cars between the factory and the steam railroad, a distance of about a mile and a half. It has been found capable of drawing nine loaded steam railroad freight-cars, weighing 200 tons, up a 3-per-cent. grade and around a double curve.

The first American electric locomotive exclusively for haulage of cars was that completed at the Lynn works in the spring of 1893 and exhibited at the Columbian Fair. The weight of this machine is 30 tons, having only a single two-motor truck. This is entirely covered above, and has an observation tower rising at the middle to double the height of the cab. It s a very compact, neat and powerful machine.

The locomotive just completed at Lynn is really an imposing electrical engine, the most sufficient in appearance of any yet constructed. Its upper parts deviate slightly from those of the one last described, while it is borne by two independent trucks of four wheels each,—all driving wheels; each pair being driven by its own specially designed motor of the single reduction spur-geared type, and mounted upon the axles as in ordinary electric street cars. The entire frame and cab are carried on elliptical springs resting directly on the top of the journal boxes, which secures easy riding and minimizes the wear of both the electrical machinery and the truck. The cab is constructed of heavy sheet iron, and the windows are so arranged as to give an almost unobstructed view from one position in all directions.

The electrical equipment, beside the motors, includes a series of parallel controller, automatic safety devices, and an air-compressor, to provide air for the brakes and whistles. There are also bells, headlights and sand-boxes, while a cow-catcher is attached at each end. The symmetry of form in this locomotive is apparent.

The dimensions and other features of the machine are given as follows: weight, 40 tons, draw-bar pull, 14,000 pounds; height over all, 11 feet 2 inches, length over draw-bars, 24 feet; width over all, 8 feet 4 inches; wheel base of single truck, 6 inches; diameter of driving wheels (3-inch steel tires), 40 inches; gauge, 4 feet 8½ inches. The engine is intended to perform the ordinary work of a steam locomotive at a speed of not above 30 miles an hour.

There is, however, in the same place, another locomotive, begun earlier, but not yet finished. It is truly a monster, being mounted on 12 wheels, and its weight is about 90 tons. The shape is unique, though in its main features conforming to the 40-ton machine. Each pair of wheels is driven by an armature on its own axle; and there are three trolleys—an arrangement that secures continuity of contact with the trolley wire.

This locomotive is being constructed for the Baltimore & Ohio Railroad, to be used in drawing trains through its tunnel under the city of Baltimore.

The great annoyance suffered by the passengers from the smoke, steam and noise of the steam locomotives during the passage of this tunnel induced the railroad company to contract for an engine which should be free from these objections. The heavy trains which pass under the city require locomotives of great draught. As trains approach the tunnel, the electric locomotive will be coupled to the front of the deadened steam engine, and will then pull the whole long train through.

Though there has been much speculative planning of long-line electric roads for freight and passengers, none but enthusiasts will assert that the time for this change in the form of traction has come, or is ever likely to come, except in a few instances, such as the straight-line road between Chicago and St. Louis, a distance of 256 miles. This road, if any, should meet with success in its plan of operating on the electric system: for it has an almost level plain for its entire course, while at a convenient distance from one end is a waterfall and at a similar distance from the other is a coal mine, in both of which the road company has secured controlling interests.

The field of the electric locomotive appears to be railroad yards, factory premises, short branches and lines and mines, having in the latter advantages which will doubtless ere long render it the exclusive system in such situations.

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LINEMAN'S SUIT.

The suit of Charles Cheiks against the Brooklyn City Railroad Company has been decided in favor of the defendant. This was a suit to recover $5,000 for injuries alleged to have been received by the plaintiff while in the employ of the street railway company. At the time of the accident Cheiks was engaged on the overhead work for the Third avenue line. He was standing on a ladder, 20 feet from the ground, connecting an insulator near one of the iron poles. Holding the wire in one hand he put his other hand on the pole to steady himself, with the result that he received a severe electric shock, which caused him to fall from the ladder. He struck on his head and shoulder and received serious injuries.

It was claimed that the company had no right to have any electric current on the wires, as the road was not in operation at the time, and that Cheiks was told by his foreman that the wires were all dead. A number of witnesses were examined on either side, and their opinions differed as to how the current got into the wires, unless it came from a cross with the wires of the Hamilton avenue line, which was in operation. It was shown for the company that the accident was due to Cheik's carelessness, as he knew better than to touch the iron pole while at work on the wires.

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FINANCIAL NOTES.

Sioux City Elevated Road Sold.—The Sioux City (Ia.) elevated road was sold Feb. 23 to D. M. Robbins, of the Northern Car Company, of Minneapolis, for $50,000.

Los Angeles Road in Trouble.—The Los Angeles Consolidated Electric Railroad Company has been taken possession of by the bondholders on account of default in payment of the half year's interest on the $3,000,000 bond issue due last September. Arrangements have been made of an amicable character and a majority of the capital stock will be delivered to the bondholders, who assume the management of the road.

Saginaw, Mich.—The Common Council of Saginaw has granted to the Saginaw & Bay City Rapid Transit Street Railway Company a franchise. The new company is composed of Akron (O.) capitalists. It has succeeded in getting a franchise embodying practically the same conditions as those granted to its competitors. The promoters of the enterprise say they mean business and are ready to begin work at once.

Ordered to Increase Fares.—Judge Speer of the United States Court at Savannah last week ordered the receivers of the Electric Railway Company, of Savannah, to advance fares from one cent to five cents, and also ordered two rival electric roads to show cause why they should not be required to advance their fares on the ground that they had entered into a conspiracy to ruin the electric railway company by forcing fares down ruinously. One rival line sells two tickets for one cent.

No Consolidation.—A report was current in New York yesterday that the people in control of the Metropolitan and Philadelphia Traction companies, as well as the Consolidated Traction Company of New Jersey, had matured plans to bring about an amalgamation of the three systems. They are at present controlled by practically the same people, and it would accomplish no good end were it possible to effect legally their consolidation. Mr. P. A. B. Widener, asked as to the report, pronounced it absolutely without foundation.—*Philadelphia Stockholder.*

Railroad Commissioners' Report.—Decisions have been handed down by the New York State Railroad Commissioners in Albany granting the application of the Batavia & Northern Railroad Company and the International & Oak Orchard Harbor Railroad Company for certificates under Section 59 of the railroad law, authorizing them to build their roads. The Commissioners find that public convenience and necessity require the construction of the roads. The Commissioners have also granted the Ballston Electric Railroad Company permission to operate a trolley line.

Lake Street Elevated, Chicago.—The Louderback and Slaughter committees of the Lake Street Elevated Railroad Company have reached an agreement in regard to the terms of reorganization. Both sides have made important concessions. Instead of a scaling of the bonds to 50, as originally demanded by the Louderback people, the agreement provides that they shall be cut to 60, and that the holders receive income bonds for 15 per cent. of the face value of their securities. The management also agrees to take care of the floating debt, amounting to over $800,000, and to provide for a guarantee of the first mortgage bonds by the Northwestern Elevated. It is further stipulated that future issues of bonds shall be in amounts to cover actual cost of construction only, instead of at the rate of $850,000 a mile, as provided for in the mortgage, and that no bonds shall be put out to pay interest charges.

Pittsburgh, Pa.—It is now announced that the Pittsburgh & Mansfield Electric Railway will be constructed during the coming summer as the final passage by the United States Senate of the bill providing for a bridge across the Monongahela River with a 750-feet span ends the long fight made against the road by the coal and rivermen. The directors propose to raise capital, complete their plans and have the line in operation as soon as possible. The Board of Directors includes E. Holbrook, President; E. K. Morse, Vice-President; John G. McDowell, Secretary; Thomas Hutchinson, Paul H. Hacke, A. P. Burchfield, M. Roseberg and Superintendent Greenwood, of the Manchester road. The bridge will start from Liberty street and strike Mt. Washington about half way up, from which point the hill will be tunneled for 1,700 feet. Carnegie is the objective point.

Long Island Traction.—The annual meeting of the Long Island Traction Company was held last Wednesday. The Board of Directors in making a statement to the stockholders the President, D. F. Lewis, said that the affairs of the company were not in such a bad condition as had been represented. He thought the difficulties in which it was involved could be overcome, and that it could be put in good condition. While $500,000 would be sufficient to take care of the actual needs of the company, it would not be well to try to get along on too little money. A plan would soon be presented to raise all the money needed. Mr. Lewis said that, although the recent strike had cost the company a great deal of money, it had proved in one respect a blessing, inasmuch as the directors and officers had now full control over their own property, and could manage it to suit themselves and the company without the interference of the Knights of Labor. It is thought that an assessment will be made on the stockholders to raise the money desired.

General Electric Earnings.—The General Electric Company is now earning upon the basis of above $2,500,000 net per annum, and if orders, as they have come in for the past two months, continue well into the present fiscal year, which began Feb. 1, there need be no action as respects the impairment of the capital of the company, for the concern will earn itself into sound position. The company is earning five times the amount of the preferred dividends daily accumulating, and there would seem to be no reason why, in time, these should not be paid. The General Electric Company is doing the largest business in its history as respects the volume of its output measured in tonnage or pieces of machinery, and were the prices equal to those of three years ago it would be earning about 30 per cent. per annum upon its entire capital, instead of having its capital sell-

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*From *Lippincott's* for March.

ing at 30 per cent. of what it has cost most of its owners. But even with prices on the present low basis the cost sheets have been liberally reduced by the introduction of machinery and labor saving devices. The company has probably earned the past fiscal year above $1.500.000, but it has continued to charge off with a liberal hand and will shrink its assets still further in the final accounting, so that probably very little margin of earnings above what may be necessary will be shown, and the capital account which is now all a matter of bookkeeping may be still further written down, swelling the capital deficit of last year. But the foundation will be laid for the business of 1895 and the exhibit next year, if times are even as good as at present, should give stockholders encouragement. General Electric directors will not talk; they have "resolved" neither to talk themselves nor allow anybody else to talk for them, but the above is not "talk," just fact, which it is not our duty to conceal.—*Boston News Bureau.*

NEW INCORPORATIONS.

Dover, Del.—The House bill to incorporate the Dover & Milford Electric Railway Co. passed the Senate Monday.

Watertown, N. Y.—The Dexter & Brownville Street Railway Company has been incorporated. The capital stock is $40,000. The promoters are H. F. Inglehart, B. B. Taggart, Jos. Mullin, Watertown, N. Y.

Chicago, Ill.—The Chicago & Grand Avenue Street Railway Company has been incorporated, with a capital stock of $50,000. The promoters are John Gnaedinger, Henry F. Kolze, Lesser Franklin, Cassius C. Clark, Elwyn D. Seaton.

Allentown, Pa.—The Allentown & Reading Electric Street Railway Company has been incorporated with a capital stock of $108,000. The promoters are Victor D. Barner, Allentown, Pa.; W. H. Kennedy and P. J. Moore, Philadelphia, Pa.

Valparaiso, Ind.—A stock company has been formed, composed of Chicago, Valparaiso and Hobart capitalists, to build an electric road from Valparaiso to Chicago. The cars will be constructed so that light freight can be shipped. The principal backers interested are milk shippers, whose daily business through these two counties is quite large.

Sackett's Harbor, N. Y.—The Dexter & Brownsville Street Railway Company has been incorporated to build and operate a street surface electric railway in Jefferson County to connect the villages of Dexter, Brownsville and Sackett's Harbor. The capital is $40.000 and the directors are: Byron B. Taggart, Hiram F. Inglehart, Jos. Mullin, Geo. H. Walker, B. B. Taggart, Jr., Chester C. Inglehart and N. P. Wardwell, of Watertown; J. A. Lobkeucher and J. Krementz, of Newark, N. J. The company's principal office will be in Watertown.

New Orleans, La.—The Gulf Coast Electric Railroad Co. has been organized. James Boardman Cable is general manager of the company. The line will extend a distance of 23 miles, from Pass Christian to Point Cade, the western promontory of Biloxi Bay, and will pass through Gulfport, the terminus of the Gulf & Ship Island Railway; Mississippi City, DeBuys and Beauvoir. The motive power will be elecricity. A power house will be built about the middle of the line. Double decked cars that will seat comfortably about 50 people will be operated. The capital stock is $500,000. It is stated the company has assurances that a great deal more money than is required will be forthcoming.

New York, N. Y.—The New York and Brooklyn Tunnel Company has been incorporated with a capital of $100,000. The company purposes to build an underground railroad, to be operated by electricity or other motive power, from a convenient point in New York City, between East Sixteenth street and Whitehall street, under the bed of the East River, to a point in Brooklyn, between North Eighth street and Atlantic avenue, a distance of two miles. The directors are Thomas A. Patterson, Jr., Charles J. Schlegel, Walter J. Aims, John C. Bucken, Charles Kuehnmundt, John V. Bouvier, Jr., Frederick P. Delafield, Frank H. Knight and Samuel S. Slater, of New York City. The company's principal office will be in New York City.

Biloxi, Miss.—A street railway company has been organized by George W. Dunbar and E. G. Burklin, who have assurances from leading merchants and citizens that they will take stock in the enterprise. The road will have three branches, single tracks, with switches. One branch will connect the Louisville & Nashville Railroad depot with the camp grounds; another will start from the depot, to Back bay and along the bay to the canning factories, and the third will leave the depot and run along Main street to the factories. The motive power will be the mule, and there will be six miles of road altogether. The company means business, as is shown by the fact that it is hardly fifteen days since the franchise for the road was granted to Mr. Burklin, and much of the material has been already purchased. The cars, rails and other material will be shipped at once. Work on the road will be begun without delay, as the services of an engineer and contractor have already been secured. The road will be in operation before the beginning of summer.

NEWS OF THE WEEK.

Palmer, Mass.—The Palmer Company and Monson Street Railway, with a capital of $60,000, has been organized.

North Tonawanda, N. Y.—W. Caryl Ely, of Niagara Falls, has been granted a franchise for an electric railway.

Sheboygan, Wis.—A company has been organized to secure a franchise to put in a trolley system to extend to all parts of the city.

Long Island City, L. I.—The Steinway Electric Railroad Company of Long Island City, which is extending its lines to Flushing, has under consideration a plan to continue the tracks to Whitestone.

Ellsworth, Me.—George N. Stover, of New York, has expressed his readiness to subscribe for two-thirds of the amount for the construction of the proposed electric railway. The capital stock of the company will be $40,000.

Brooklyn, N. Y.—Mayor Schieren announced a few days ago that he would order the presidents of the surface railroad companies arrested if they did not at once reduce the rate of speed of their cars to the limit allowed by law.

Boston, Mass.—The experiment of carrying mail on the electric cars has thus far proved successful. The running time to South Boston is made in 18 minutes, a saving of 12 minutes on a trip of 24 minutes, or a round trip; the time now allowed a wagon being 30 minutes.

Philadelphia, Pa.—The Hestonville, Mantua and Fairmount Passenger Railway Company has ordered open cars Half of the number will be built without a footboard on the side, passengers entering and leaving by the platforms. The seats, which will be cane, will be reversible, and the cars will have an aisle down the centre.

Boston, Mass.—J. H. Bickford, of Salem, who was engaged as engineer for the company which asked leave to introduce a bill in the House granting the rights to build an elevated road in Boston, is quoted as saying that there was a great deal more back of the project than appeared, and that New York capitalists were prepared to back the scheme to the extent of $25,000,000.

Portland, Me.—Work on equipping the lines of the Portland Railroad Company for electric traction will probably commence by April 1. It is expected that the road and power station will be completed by July 1. The station, which is to be located on the made land at Deering bridge, will be built of stone, brick and iron, and will be a handsome building. The three engines of the present Deering plant will be removed into this house, and in addition there will be installed two large compound condensing engines capable of developing 800 H. P. each. The company now has about nine miles operated by electricity. When the whole system is equipped the company will have 21 miles of electric road.

Sault Ste. Marie, Mich.—There is a demand for an electric railway from Sault Ste. Marie to Pickford, and thence to St. Ignace. Such a road, a local paper says, could take in Rosedale and Munoskong City. "It would be a good feeder for the Soo and a great benefit to the country. The time is not far distant when Pickford must have better means of transportation. The amount of goods necessary to supply the three general stores is constantly increasing, and freighting it by teams over such roads as we now have is extremely costly. The wonder is that the storekeepers sell as cheaply as they do, when they have to pay so much for freight. The day for hauling goods by oxen is past. Who will move to give us rapid transit?"

Lima, O.—It is announced that Chicago capitalists are planning to build an electric road from Lima to Bellefontaine, a distance of about 100 miles. The road, it is stated, could follow the right of way secured several years ago for the Columbus, Lima & Milwaukee Railroad. All the grading and building of culverts have been done, and it would require but little repairing to make the bed suitable. The line would be a direct cut toward Columbus, which has no direct communication with the northwestern portion of the State. The grading for the Columbus road is also completed between Lima and Defiance. Bridges and culverts have been in for several years, but the completion of the road has been delayed, and it is expected should the Bellefontaine road be built it will be extended to Defiance, and then in the other direction to Columbus.

Hartford, Conn.—The railroad committee of the legislature gave a hearing last week on the petition of the Windsor Locks & Suffield Electric Road, to extend its tracks on a route which would parallel the present branch of the New York, New Haven & Hartford road, from Windsor Locks, about four miles northward, to Suffield. Director Henry C. Robinson, of the New York, New Haven & Hartford road, said that his company was in opposition to the extension, because it would destroy the business of the branch road to Suffield. He said that the road managers felt called upon, in the interest of their stockholders, to oppose all street railroads which will parallel the steam road or its branches. Vice-President Hall is at present, he informed the committee, engaged in preparing figures showing that the competition of existing street railroads parallel to the New York, New Haven & Hartford road has effected the receipts of the steam road, and necessitated the taking off of several trains,

Woodbury, N. J.—The Camden, Gloucester & Woodbury Company, which recently completed the exension of its road to Mantua, will, it is stated, in a few days commence the building of a second track from Woodbury to Mantua; and, while there is a strong desire on the part of residents of Blackwood to secure an extension from Almonesson, it is not probable that the company will consider that extension for some time to come. The Mullica Hill extension, which has long been under consideration, will most likely be disposed of first by running a line from Mantua to the Hill, a distance of about five miles. The company is as yet undecided about operating the lines to Pitman Grove and Glassboro this year, but this extension will undoubtedly be built within a year or two. The new company, known as the Gloucester County Rapid Transit Company, expects to run through a number of the towns along the Swedesboro and Salem road, and there is also some talk of building a branch road to the resorts on the Delaware, Lincoln and Germania Parks.

Boston, Mass.—The house committe on street railways last week gave a hearing on the bill relative to the licensing of persons engaged in the employment of street railway companies as motormen. The bill provides that no person shall hereafter be employed by any street railway company as motorman unless such person first receives a license from a board of electrical examiners, consisting of three persons, to be appointed by the mayor of every city with the approval of the board of aldermen. A person desiring to engage himself as a motorman shall apply to the board in the city where he intends to work, and shall be examined as to his practical knowledge of motors and their appliances and the operation of electricity thereon, and their general qualifications for the position. The license will cost 50 cents and may be renewed annually for the same sum. The board may employ an expert electrician for not more than 30 days in any one year, who shall conduct the examination. It was stated that it is intended by the passage of this bill to prevent an unexperienced man taking charge of a car. J. Otis Wardwell, representing the Street Railway Association, opposed the bill upon the ground that it was too radical, unnecessary, and might in an emergency prove a detriment to travel.

PERSONALS.

Mr. Arthur Crandall, of Chicago, is in New York this week.

Mr. Joel B. Hurt, of Atlanta, President of the American Street Railway Association, was in New York this week.

Mr. John A. Brill, of the J. G. Brill Co., Philadelphia, was in New York this week.

TRADE NOTES.

Berlin Iron Bridge Co.'s Contracts.—The contract for the iron roof for the new machine shop for the Hudson River Water Power & Paper Company, at Mechanicsville, N. Y., has been placed with the Berlin Iron Bridge Co., of East Berlin, Conn. The Poughkeepsie Electric Light & Power Co., of Poughkeepsie, N. Y., has placed the contract for its new plant with the Berlin Iron Bridge Co. The engine and dynamo room will be 61 feet wide and 172 feet long, and the boiler room 77 feet wide and 60 feet long. The whole will be covered with the Berlin Iron Bridge Co.'s patent anti-condensation corrugated iron roofing.

Orders of the Walker Manufacturing Company.—Among some of the larger orders taken already this year by the Walker Manufacturing Company, Cleveland, O., may be mentioned the following:

The Complete Electric Construction Company, New York City, two 50 K. W. belted lighting generators; the Rahway Electric Railway Company, Rahway, N. J., one 100 K. W. belted generator and three double car equipments, 25 H. P. steel motors; the Philadelphia Construction Company, Philadelphia, Pa., for the Schuylkill Electric Railway Company, Pottsville, Pa., three 400 K. W. belted generators and switchboard apparatus and two double car equipments, 25 H. P. steel motors; the Michigan Electric Company, Detroit, Mich., for the Saginaw Consolidated Street Railway Company, Saginaw, Mich., one 200 K. W. belted generator and six complete car equipments, 25 H. P. steel motors; the Hartford & West Hartford Street Railroad Company, Hartford, Conn., two double car equipments, 50 H. P. steel motors, and two double car equipments, 25 H. P. steel motors: C. E. Loss & Co., Chicago, Ill., for the Waukesha Street Railway Company, Waukesha, Wis., one 150 K. W. belted generator and three double car equipments, 50 H. P. steel motors; The Detroit Railway, Detroit, Mich., two 400 K. W. direct coupled generators; one 750 K. W. direct coupled generators; Gloucester, Essex & Beverly Street Railway Co., Gloucester, Mass., two 225 K. W. direct coupled generators: the Worcester Construction Company, Worcester, Mass., for the Gloucester, Essex & Beverly Street Railway Co., sixteen double car equipments, 25 H. P. steel motors; the Jaspar County Electric Railroad Company, Carthage, Mo., two 200 K. W. belted generators, five double car equipments, 30 H. P. steel motors. Besides the above the company has taken orders for its spring mounted steel motors for the Louisville Railway Company, Louisville; Atlantic Avenue Railway Company, Brooklyn; Steinway Railway Company, Brooklyn; Ottumwa Electric Railway Company, Ottumwa, Ia.; Aurora Street Railway Company, Aurora, Ill.; Bloomington City Railway Company, Bloomington, Ill.; Kansas City Railway Company Kansas City, Mo.; Atlanta Electric Railway Company, Atlanta, and many others. It has also taken large orders for its general work, among which may be mentioned the contract for four 2,000 ton, steam and hydraulic cotton compresses for Mr. W. W. Bierce, Montgomery, Ala.

RECORD OF STREET RAILWAY PATENTS.

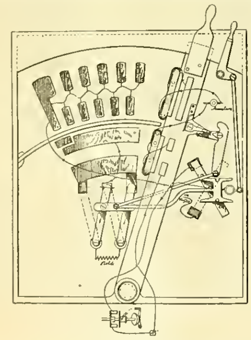
U. S. Patents Issued Feb. 26, 1895.

534,642. Railway Supply System. Harding F. Gray, Passaic, N. J., assignor to the Gray Electrical Transit Company of New Jersey. Filed Aug. 8, 1893. The set of contacts or conductors normally is disconnected from the source of supply, while switches for placing contacts in connection with a source of supply as the car or vehicle moves along its path, are provided. A supplemental test contact is carried by the vehicle, and means controlled by the abnormal current flowing over the same breaks the connection between the source and the contact or conductor when the test conductor finds it connected. (See Illustration.)

534,657. Mechanism for Operating Switches for Street Cars; Andrew McKenzie, Brooklyn, N. Y. Filed March 21, 1891. A bed plate is supported on a sleeper adjacent the switch rail, and has a hand hole for which there is a cover for a hand hole, and a shoe on the bed plate. A plate having connections with the shoe passes through a slot in the bed plate, and a bolt is extended from the switch rail through a slot opening in the end of the plate.

534,662. Electric Railway System; Herluf A. F. Petersen, Milwaukee, Wis. Filed Nov. 8, 1893. The conduit comprises a suitable casing divided into a plurality of longitudinal passages or compartments, one of which is arranged to communicate at intervals with a sewer, and provided in its upper wall with a longitudinal slot. Another of the passages is arranged to contain the conductors, and is provided with a longitudinal opening for normally closing which a suitable cover is arranged. Blower mechanism is arranged to discharge into the passage containing the conductors, and comprises an electric motor and a fan actuated thereby, a switch for controlling the motor, a suitable device connected with the switch and with a device sensitive to moisture, whereby the switch is adjusted so as to start the motor when the air in the conduit becomes moist, or to cut out the motor when the air has become dry.

534,663. Underground Conduit for Electric Railways; Herluf A. F. Petersen, Milwaukee. Wis. Filed March 26, 1891 An underground conduit for electric conductors is arranged to extend longitudinally adjacent to the track, but wholly outside of the line of the track. A contact carrier arm is adapted to normally extend laterally past the line of one of the track rails and downwardly into the conduit and provided with suitable contact devices, for electrical engagement with the conductors therein. Suitable means to raise, lower and laterally adjust the arm, and suitable means are adopted for engagement with the arm for holding it in its raised and retracted position.



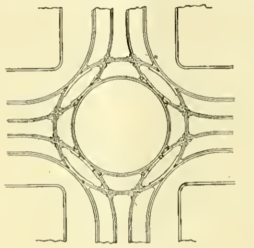
No. 534,975.

534,676. Clutch for Shafts; Elmer A. Sperry, Chicago, Ill., assignor to the Sperry Electric Railway Company, Cleveland, Ohio. Filed April 29, 1892. A shaft coupling comprises an internally toothed gear wheel and a gear wheel of smaller pitch diameter meshing with it. The length of the teeth of both wheels is substantially the same as the difference in their pitch diameters, and they are both free to move relatively in a radial direction.

534,711. Compressed-Air Motor for Street Car Propulsion; William Creely, Bay City, Mich. Filed April 6, 1891. There is a compressed air tank for storing compressed air. while a series of compressed air engines drive a main shaft on which there are a series of clutches and a series of sproket wheels. A series of sprocket chains leads from the sprocket wheels to a series of sprocket wheels upon the axles of the car. A series of air pumps is conveniently arranged upon the sides of the car trucks, the pumps communicating by means of suitable valves and pipes with the air tank and operated by any suitable means from the revolving car axle as by means of eccentrics oscillating eccentric straps. Suitable clutches throw the eccentrics in and out of gear with the revolving car axle.

534,752. Brake for Railway Cars; Thomas Millen, New York, N. Y. Filed October 25, 1894. The standard that carries the hand wheel is provided on its lower end with a gear wheel, which engages with and operates a large gear wheel and sprocket wheel in connection with an auxiliary spocket wheel and suitable brake chains and rods.

534,798. Sanding Device for Railways; Cyrus R. Howard, Johnstown, assignor of one-half to J. C. McSpadden, Rockwood, Pa. Filed Nov. 26, 1894. The sanding device comprises a receptacle for the sand. A duct leads downward from the receptacle. A valve at end of the duct, being actuated by a spring, normally closes the duct, but is adapted to be forced open by the sand. A feeding-worm is adapted by its rotation to force the sand downward from the receptacle against the valve, and there is mechanism whereby the car operator may rotate the worm.



No. 534,818.

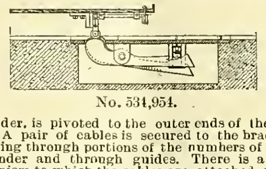
534,800. Brake for Railway Cars; Solomon Kreisher, Snydertown, assignor of two-thirds to George O. Martz, Shamokin, and J. H. Martz, Reed Station, Pa. Filed Jan. 15, 1895. The brake shaft socket is provided at its top with a head, and has a quadrant-shaped opening. It is provided at the bottom with a socket opening. having on its interior a shoulder or stop. The hand wheel is provided with a stem arranged in the socket and has its lower end inter-interlocked with the socket opening being capable of a limited vertical movement to disengage its lower end and arranged to swing downward into a horizontal position, and to engage the stop or shoulder.

534,818. Combined Switch, Loop, and Cross-over for Railways. James Davis and William A. Thomas, Pittsburg, Pa. Filed Nov. 15, 1894. This is the combination of an annular track and a series of branch lines connected therewith. (See illustration.)

534,822. Fender for Cars. Stephen Essex, Providence, R. I., assignor to himself and Isaac W. Sawin, same place. Filed July 7, 1894. The side bars have outwardly inclined upper ends, and there is main netting between the side bars, the spring connecting the main netting with the said bars. The inclined side nets are connected at their upper end by springs with the inclined ends of the side bars and at their lower ends with the forward extension of the frame.

534,834. Battery System for Electric Railways; Edmond Julien, Brussels, Belgium. assignor to the Electric Storage Battery Company, Gloucester, N. J. Filed Dec. 9, 1886. Patented in England Feb. 19, 1886, No. 2,470, and in Belgium Nov. 19, 1886, No. 75,288. There is a stationary charging bench or pier having its top level with the car-floor. There are poles or contact pieces on the bench or pier, and drawers containing accumulators and bearing poles or contact pieces. An exterior electric circuit comprises a stationary source of electricity and the poles or contact pieces on the charging bench or pier, the whole being so arranged that the drawers when pushed on to the car automatically complete circuit with the motor and regulator, and when drawn off the car on to the bench or pier automatically complete circuit with the source of electricity for charging.

534,913. Car Fender; Horatio Phinney, Providence, R. I. Filed Nov. 21, 1891. The fender is formed of a netting secured thereto and furnished with rings at its sides, bracing rods being pivoted below the fender. A guard rail, forming the forward portion of the fender, is pivoted to the outer ends of the bracing rods. A pair of cables is secured to the bracing roos extending through portions of the numbers of rings on the fender and through guides. There is a take-up mechanism to which the cables are attached, and a releasing device for said take-up mechanism.



No. 534,954.

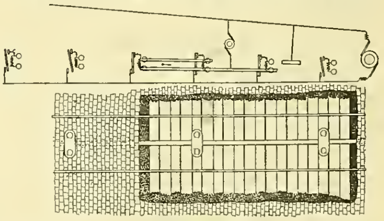
534,954. Railroad Switching Device; William L. Geisler, Hempstead, assignor of one-third to Louis Haeberle, New York, N. Y. Filed Nov. 21, 1894. There is a slotted cover plate over an excavation in the road bed, and a switch tongue pivoted on the plate. Two pivoted levers extend normally at one of their ends their ends through the slots in the cover plate and have trackways formed on their upper edges near the other ends. A pivoted tilting arm is supported from the cover plate and has near each of its ends an anti-friction roller, the rollers being arranged above the track ways on the ends of the pivoted levers, and adapted to engage therewith. There is a connecting device between the tilting arm and the switch tongue. (See illustration.)

534,956. Electric Trolley Railway; Joshua M. Hammill, Aldan, Assignor of one-fourth to John S. Latta and James J. Mulconroy, Philadelphia, Pa. Filed Jan. 23, 1894. The conductor is located in a slotted conduit and a shield is interposed between the slot and the conductor. The trolley wheel has insulating flanges, the trolley arm being bent around the shield and having throughout an external insulating coating or covering and an outer casing surrounding that portion of the insulated trolley arm which passes through the slot of the conduit. (See illustration.)

534,974. Electric Brake; Elmer A. Sperry, Cleveland, Ohio, assignor to the Sperry Electric Railway Company, of Ohio. Filed Jan. 30, 1894. Claim 13 reads as follows: "In an electric retarding device, a moving mechanism, a surfaced mass of magnetic material and a circular electro-magnet having a co-operating face, the two being mounted for relative movement, a groove or depression in said magnet being comparatively small at its face and recessed or widening at points deeper or farther removed from such face, presenting thereby enlarged magnetic faces or poles, the magnet being formed of different members, which are secured to each other for purposes of forming such recess and of inserting the conductor, a suitable electric conductor located in the deeper portion of such depression or recess, a portion of such recess next the surface not occupied by such conductor, in combination with an electro-conducting filling in the contracted portion of the groove above said conductor."

534,975. Apparatus for Arresting Motion of Electrically Propelled Mechanism; Elmer A, Sperry, Cleveland, O., assignor to the Sperry Electric Railway Company, of Ohio. Filed Feb. 5, 1891. This is the combination, with an electric motor, of a variable resistance, a local circuit, a brake magnet coil, a brake switch arranged so that when the braking action is taking place the line circuit is open, the blade of the switch being permanently in connection with the variable resistance, and suitable electrical connection between the variable resistance and the brake magnet coil, switch and motor (See illustration).

534,976. Car-wheel; Elmer A. Sperry, Cleveland, O., assignor to the Sperry Electric Railway Company, of Ohio. Filed June 6, 1894. The wheel has a chilled tread, a lateral face with a certain thickness of metal backing the same disposed between the tread and hub and forming a portion of the web of the wheel. A portion is curved as to section interior thereto and between the face and the hub.



No. 534,642.

534,977. Electric Brake; Elmer A. Sperry, Cleveland, O., assignor to the Sperry Electric Railway Company, of Ohio. Filed June 8, 1894. In a brake for cars, a revolving part is mounted on the car axle, a brake magnet co-operating therewith. There is a groove within the brake magnet, a magnetizing coil in the groove smaller than the groove, and an insulating sulphur-like filling poured into the groove while in a liquid state. The filling is of such material as to become hard and form ample support and insulation for the coil.

534,982. Car-Fender; Albert J. Thornley, Pawtucket, assignor to the Consolidated Car Fender Company, Providence, R. I. Filed Dec. 6, 1861. A fender-shaft is journaled in the side arms and a bracket-plate secured to the shaft. A lever is pivoted to the bracket-plate, and a stop adjustably mounted on the bracket-plate and adapted to bear on the lever. A casting has a vertical slot in which the lever is free to reciprocate and move vertically, and a latch pivoted to the casting has an arm for engaging the lever. A spring-supported arm actuates the latch, and a plunger depresses the actuating-arm.

534,986. Conduit Electric Railway; Michael F. Flynn, Stamford, Conn. Filed May 24, 1894. The conduit has parallel top flanges, and the trolley rail is arranged between the flanges, the trolley having plows to travel between the flanges and the rail, the oscillating plates are arranged beneath the rail and extend into the paths of the plows. The line wire is in the conduit, and means actuated by the movement of the plate switch the current from the line wire to the trolley rail.

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As the STREET RAILWAY GAZETTE is published 52 times a year, and is the only weekly publication devoted to Street Railway Interests, its value as an advertising medium will be apparent to Manufacturers and Dealers in Street Railway Apparatus and Supplies of every description. We will take pleasure in quoting rates for advertising space.

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Death of E. J. Hart.

We regret to announce the death of Mr. E. J. Hart, president of the Canal & Claiborne Street Railroad Company, of New Orleans. Mr. Hart was perhaps the most prominent business man of his city; he was a man of splendid business ability, of wonderful energy and perseverance, and was possessed of many personal qualities that endeared him to a wide circle of friends.

Electric Lighting on the Brooklyn Bridge.

The New York and Brooklyn Bridge is now equipped with an overhead trolley system, but the electric current is to be used for lighting, and not traction. The new system by which the cars are to be lighted will effect a great improvement, for which the patrons of the road have been anxiously waiting. Electrical engineers have long looked forward to the operation of the bridge cars by electricity—Prof. Elihu Thomson among the number, we believe—but it will probably be some little time before their wishes are gratified. The bridge affords an ideal location for the operation of a cable road, and as the trustees are well satisfied with the economy and reliability of the existing motive power, no change in the immediate future is probable.

Trolley Party Season Opened.

The trolley party season has already opened, and, if a conclusion may be drawn from the success of the early excursions, a large business of this kind will be done by the street railway companies during the summer. A few nights ago a party of 150 persons enjoyed an extended ride on the electric railway system of New Haven, and on a subsequent evening cars were chartered by another party nearly as large. There seems to be no possible doubt that the trolley party has come to stay, and companies that make proper provision for them will find that they will bring them in a very handsome income. It is true beyond a doubt that in many places the purchase of cars, perhaps double-deckers, designed especially for the accommodation of trolley parties, would be a decidedly profitable investment.

Electric Conduit Railways.

The underground conduit electric railway in Budapest has long been exploited as a model of excellence, and in an article published elsewhere its meritorious features are emphasized. The Budapest road is for many reasons an interesting electric installation, but unless it is decidedly exceptional among European tramways in many particulars it cannot be regarded as a model, so far as service is concerned, for American street railway companies to follow. A high degree of excellence in tramway service is not demanded, or at least is not afforded, in Europe, and the best of the roads may be considered poor enough from an American point of view. But it will not be necessary for Americans to go so far from home in order to learn of the possibilities of the underground conduit electric railway. The Lenox avenue conduit roads in New York City, embodying the latest ideas in electrical construction, and built without regard to expense, will soon be in working order, and its operation will demonstrate conclusively the possibilities of conduit roads under the conditions that exist on this side of the Atlantic.

Trolley Speed in Brooklyn.

During the last few months the matter of the speed of electric cars has been under active discussion in the city of Brooklyn. To alleged excessive speed the very considerable number of accidents to persons has been generally attributed, and several investigations have been made to determine the maximum rates at which cars travel at times. Within the last few weeks city officials have made especial efforts to determine car speeds, in order to ascertain if the maximum rate of 10 miles per hour, as prescribed by the ordinance, was not exceeded. According to the returns, violations were extremely frequent. The reports show that cars were frequently traveling at 17 miles an hour; sometimes at 20 miles an hour, while speeds of 13 and 15 miles per hour were very common. Reports submitted by inspectors, hired by private individuals, show even higher car speeds; several were said to be running past a certain point at 20 miles an hour, one at 26, one at 28, and finally one was reported to be operated at 30 miles per hour. The reports are so numerous and refer so specifically to the violations of the ordinance, that the conclusion cannot be avoided that very high rates of speed are at times attained, though it probably would not be argued that these excessive speeds are maintained over any considerable distance. A very decided suspicion, however, was cast upon the figures when it was asserted by an official of one of the street railway companies that some of the inspectors who were turning in reports were formerly street railway employees, who, as a result of the recent strike, were out of work and were not friendly disposed toward the companies. The returns were such, however, that Mayor Schieren and the Board of Aldermen determined that something should be done at once in regard to car speeds, a matter with which they had been wrestling for several months, and an ordinance suggested by the former and amended somewhat by the latter has just been adopted. It is interesting to note the result of so long a period of deliberation over this important matter. It is provided that the speed of the cars shall not exceed six miles an hour within a radius of one-half a mile from the City Hall, and the ferries; eight miles an hour within a mile of these points, and 10 miles an hour in the other sections of the city. The ordinance contains other provisions relating to stopping the cars at crossings and to the use of platform gates, which need not be considered in this connection. The limiting of the speed in the crowded portions of the city cannot be objected to, and, if the ordinance is not obeyed, either the motormen or the companies, if they allow the men to violate it, should be made to pay the penalty. But there is no reason why 10 miles an hour should be fixed as a maximum. There are districts in Brooklyn where the speed can be considerably greater than that and still not be regarded as excessive. In the outlying sections 15 miles an hour could be safely permitted, and it seems to us that an ordinance to be framed on the plan adopted by the Board of Aldermen should go further and specify districts in which speeds higher than 10 miles an hour should be allowable. As it now reads, we question whether the new ordinance will be any more satisfactory to the people than to the companies. The residents of the outlying districts want rapid transit, and will not be satisfied with a speed of 10 miles an hour when they are traveling to their business in the morning or returning to their homes at night.

THE NANTASKET BEACH ELECTRIC LINE.

Work on the Nantasket Beach line of the New York, New Haven & Hartford Railroad Company, which is to be equipped for electrical operation, is already under way. A new bridge will be constructed over the Weir River and the sea wall between the Hotel Standish and the Ocean House will be carried out on the beach several feet to make room for the roadbed for the second track. The telephone poles and wires of the New England Telegraph and Telephone Company along the line of the railroad will soon come down, as they interfere with the work of building the road, and the telephone company has been notified to remove them. The company has purchased four acres of ground adjoining its tracks situated between the Old Colony House and Nantasket and will then build a power station.

◆

CHICAGO & NORTH SHORE POWER PLANT NOT DESTROYED.

The building of the Chicago & North Shore Railway Company at Edgewater, a suburb of Chicago, was not as seriously injured by fire as was at first reported by the telegraph. The structure was not destroyed, as the first report had it, but only the small annex car-house at the south end of the building was destroyed. Here five motor cars and four trailers were stored. Their loss did not seriously interfere with the operation of the road. The remainder of the cars were housed in a different part of the building and were uninjured. The power plant was not affected. The loss, it is stated, will not exceed $15,000, which is covered by insurance. Before the ruins of the car-house had ceased to smoulder, the company had arranged for the immediate reconstruction of the burned portion of the building.

◆

GRADE CROSSING QUESTION IN MASSACHUSETTS.

The committees on street railways and railroads of the Massachusetts Legislature gave a hearing last Monday on the bill providing that no street railway shall hereafter be constructed across the tracks of any railroad at the same level therewith without the consent of the railroad commissioners, nor shall any railroad hereafter be constructed across the tracks of any street railway without such consent.

The representative of the Boston & Albany railroad stated that he thought it scarcely fair to say that street railways shall not cross railroads at grade till the consent of the railroad commissioners has been obtained.

"I do not want to be understood by that," he continued, "to say that as a general proposition crossings at grade by street railways are at all safe. I think the opposite is most true, and has been demonstrated. But the railroad commissioners, after years of experience, have declared against such grade crossings. Their stand on this question is well known.

"It is feared by the advocates of the construction of street railways and by the local authorities that such a board would not sufficiently consider the rights of communities for such crossings by their street railways. I believe that the railroad commission would be eminently impartial in deciding against such a crossing if public exigency demanded it. Yet the feeling I have alluded to does exist among the local authorities, and friends of street railway construction, and for this reason I submit to you to-day a substitute bill."

The substitute bill provides that the corporation desiring to cross tracks shall have the right to elect whether the railroad commission or a special board of commissioners, to be appointed by the Superior Court, or any justice thereof, shall decide whether or not it shall have the right to cross as desired. The bill also contained an additional provision that in the future of abolition of grade crossings the street railway pay 10 per cent. of the cost of such abolition.

This provision, Mr. Hoar said, would cause street railways to take a serious view, and be warned that if they go ahead and make their construction across the tracks of a steam railroad, then if the grade is ordered to be abolished they shall pay 10 per cent. of the cost.

"You would then," he concluded, "only have crossings at grade where real public necessity demanded them."

J. Otis Wardwell, appearing for the Massachusetts Electric Railway Association, opposed the passage of such a bill, which, he said, emanated purely, simply and solely from the steam railroads of the commonwealth. He called the attention of the committee to the electric railway systems that had been constructed during the past few years.

In every system there was not only an exigency but a serious demand for that additional convenience and transportation which the electric roads accorded.

"This opposition to the electric roads of the State comes purely, simply and solely from the steam roads," he continued. "If the people of Massachusetts want to crush out and destroy us, and say that in the future there shall be no further development of the electric systems, then pass this bill which has been presented here. There is room for us both, and there is work for both of us to do."

◆

SPEED ORDINANCE IN BROOKLYN.

The Brooklyn Board of Aldermen has for some little time had under consideration the matter of regulating the speed of electric cars. Complaints that the speeds of cars are often greatly in excess of 10 miles an hour, as allowed by the city ordinances, have been very frequent. Since the strike the charges againt the companies have greatly increased in number and three weeks ago an inspector was appointed by the city to watch cars to determine the frequency of violations of the ordinance. According to a single report covering the hours from 2 P. M. to 7 P. M. on March 6, 12 instances of excessive speed were discovered; one car was found running at 24 miles per hour, three at 17 miles per hour, one at 15 miles per hour, and six at 13 miles per hour.

A private individual sent to the Aldermen a report showing excessive speeds as noted by an inspector whom he had hired on his own account, 41 cases were reported of speeds in excess of 10 miles an hour, one car was found running at 30 miles an hour, ten at 20 miles or more per hour, and ten at from 15 to 20 miles per hour. The companies, however, did not believe in the accuracy of the figures, as it was asserted that some of the men employed as inspectors were former employees of the companies who were not friendly disposed toward them as a result of the strike.

Mayor Schieren has been greatly interested in the matter, and last week submitted an ordinance on the subject to the board of aldermen. This measure fixed speed in the crowded districts at six miles per hour, while in the outlying sections of the city speeds of eight and 10 miles per hour were permitted.

The railroad committee to which the proposed ordinance was submitted held a meeting at which the companies' representatives were allowed to express their views.

President D. F. Lewis, of the Brooklyn Heights Railroad Company, believed the front platform should be left open, so people could get out there as well as at the rear. The section in regard to the occupation of the front platform, he thought, should be modified. He believed three persons could be left on the front platform without inconvenience. It was a great convenience to smokers, and, as they usually stand, they are not in the way of the motorman. He continued: "Most of our accidents are to children, and could be prevented if you would pass an ordinance prohibiting them from playing on the streets and keeping them on the sidewalks. You will find children standing in front of cars with their hands up, waiting until the cars are almost upon them. Then they jump out of the way at the last moment.

"This seems a radical thing and as if the railroads wanted to monopolize the streets. This is not our object. I think it is a most reasonable thing. I don't think the Police Department does enough in detailing policemen at corners where children are in the habit of crossing to and from school. You ought to do all you can to prevent accidents by having policemen at these places. They could be taken off streets they patrol in the morning, where they are not needed and assigned to this duty."

Alderman Leach said he thought the railroad companies might furnish the men.

Mr. Lewis replied, "I don't. What do we pay taxes for? We pay $200,000 a year. It is not an extravagant thing we ask."

President Slocum, of the Coney Island & Brooklyn Railroad Company, said that the rules which were applied to other companies would not be applicable to his, because his cars could run at ten miles an hour within half a mile of the City Hall with perfect safety. He also contended that it would be absurd to limit the speed of his cars where they run parallel with the Manhattan Beach and Brighton roads.

At the meeting of the Board this week the committee presented the report containing the following provisions, and after considerable wrangling was adopted:

No car shall run faster than six miles an hour within a radius of a half mile from the City Hall, or foot of Broadway, or on Fulton street, between Sands street and Flatbush avenue; nor faster than eight miles an hour within a radius of one mile of either of the two points first mentioned, nor faster than 880 feet a minute in any other part of the first 28 wards of the city. Outside of the half-mile limits defined, no car, "unless compelled to do so," shall stop inside of any block which does not exceed 300 feet in length. Where any block exceeds 300 feet, cars may be stopped at points to be indicated. All cars stopped at street corners shall stop with the front platforms at the near crossing. All cars must come to a full stop before crossing any steam road, and must be slowed down to a speed not exceeding four miles an hour before crossing any intersecting surface road and before crossing Bedford avenue, Clinton avenue and Schermerhorn street. Not more than three passengers shall be allowed at any time to stand upon the front platform, but both platforms may be used for the egress and ingress of passengers. Platform gates on the track side shall always be kept closed. All cars must be licensed. A penalty of $25 is provided.

◆

ATTACKS ON STREET RAILWAYS.

The attitude of the Missouri legislators toward the St. Louis street railway companies has aroused the indignation of the officers of these organizations. One of the presidents of a St. Louis company is quoted by the St. Louis *Globe-Democrat* as saying:

"St. Louis has the reputation wherever the present style of transporting the people is in vogue, and that is the world over, of being the best equipped railway city on the globe. Here the finest, largest and costliest cars can be found. Here all the innovations for the comfort and convenience of the riding public are first introduced. The people, through their servants, the public officials, have been liberal in the granting of franchises for overhead trolley lines, which liberality the companies would not see outdone, and they built many branches and extensions, not a few of which will not pay operating expenses for some time to come. The companies have also been free in giving transfers and cars at very short intervals of time. Of course these accommodations, to a more or less extent, were given through competition engendered by building too many additions and extensions. I can truthfully and emphatically say that we street railroad men have expended our money, the money of our friends and the profits of the companies in bringing the properties to their present excellent condition. We regard it as an investment that will pay fair dividends some time in the future. Now come these assaults in the shape of threatened legislation, which, if enacted, would utterly ruin our business, and demoralize the excellent service the people are enjoying into a second-rate one. I entertain the opinion that those who want the railroads to do almost impossible things and live are in the minority. Still, I think that a word of remonstrance on our part against such proposed action is timely and proper."

NEW YORK AND PHILADELPHIA ELECTRIC ROAD.

Work on the section of the New York and Philadelphia Traction Company's line between Bound Brook and Somerville, N. J., is being pushed forward as rapidly as the weather will permit. The material for the greater portion of the section is on the ground and the rails will be laid as soon as the condition of the ground is favorable. The road bed will be of a very substantial character and the rails weighing 80 lbs. to the yard will be laid between the towns.

◆

ELECTRIC ILLUMINATION OF THE NEW YORK AND BROOKLYN BRIDGE CABLE CARS.

A view of the power plant for the new electric system for lighting the cars on the New York and Brooklyn Bridge is shown in the accompanying illustration. A somewhat detailed description of the features of the overhead trolley line by which current will be delivered to the cars appeared in the Street Railway Gazette of February 2 last. The power plant is about completed, and hereafter the passengers on the bridge cars will have abundant light by which to read the papers.

The new electric generating plant is located in a gallery in the dynamo room of the Bridge power station situated on Washington St. Brooklyn. The plant consists of two Armington & Sims automatic cut-off engines of 40 horse power each directly connected to a General Electric 35 kilowatt generator.

The switchboard shown in the illustration is of white marble and is seven feet long and eight feet in height. It is equipped with Weston and General Electric instruments.

A view of the trolley which is used on the cars is shown in Fig. 2. The trolley wheel is held against the wire by two spiral springs. The pole is about two feet in length and is mounted on a neat iron base.

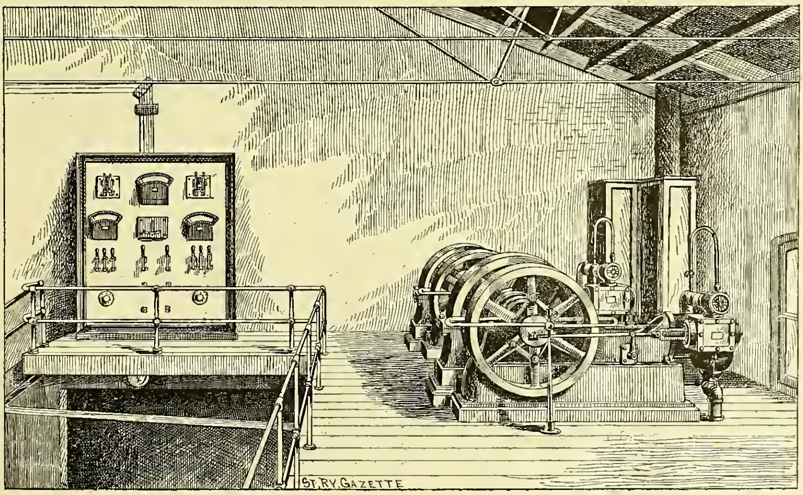

FIG. 1.—ELECTRIC POWER PLANT FOR LIGHTING THE NEW YORK & BROOKLYN BRIDGE CABLE CARS.

The plant was installed by the Electrical & Mechanical Engineering Company of New York, and throughout the work has been done in the most substantial and workmanlike manner.

◆

New Orleans, La.—R. T. McDonald, S. C. Lumbard, A. D. Guild and C. C. Gould, Mr. McDonald's secretary, all of Fort Wayne, Ind., were in New Orleans last week. Mr. McDonald is interested in local traction, and the other two gentlemen are stockholders. There are also interested with him in street-car services in Dallas, Houston and San Antonio. Mr. McDonald, when seen by a reporter of the *Picayune*, denied any knowledge of the movement to secure franchises and operate parallel street cars in New Orleans in opposition to the New Orleans City & Lake Railroad Company.

ARBITRATION BOARD ENJOINED IN NEW ORLEANS.

The Louisana State Board of Arbitration and Conciliation last week began an investigation into the controversy existing between the street railway companies of New Orleans and their employees. The latter, through the local union, demanded increased pay and shorter hours and the companies refused to make the desired concession, and decided not to treat with the officers of the union. The union then brought the matter before the Arbitration Board. In reply to the notice that the arbitrators would canvass the matter, a letter signed by the presidents of all the street railway companies was sent to the board. In the course of this communication the companies explained their reasons for refusing the demands of the men in the following terms:

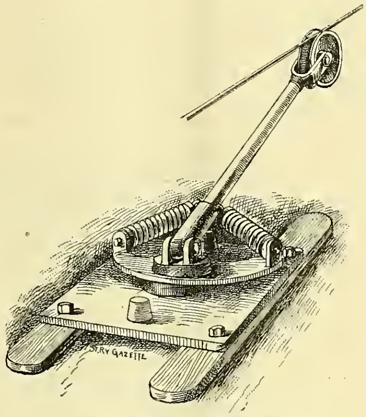

Fig. 2.—Trolley Used on the New York & Brooklyn Bridge Cars.

> We desire to call the attention of your honorable board to the fact that we are now passing through the aftermath of the severest panic this country has ever experienced. All business and trades are prostrated and suffering. The great products of the soil, namely, sugar, cotton and wheat, are selling at disastrously low prices; in fact, at prices that are well calculated to bankrupt the great farming and planting interests of our land. As a consequence, the railway companies of the land, both street railway and steam railway, are suffering from a diminished traffic. The people of this country have lost thousands of millions of dollars and feel poor; they do not ride when they can conveniently walk. Therefore the companies are not in a position to grant increase in wages, nor shorter hours at the same rate of wages, which is tantamount to an advance in wages. To do this would practically bankrupt the railway companies of New Orleans. We cannot, therefore, entertain the proposition. There is one more fact to which we desire to call your attention, namely, that since the panic of 1893 wages have been generally reduced throughout the North, while the street railway companies of New Orleans have been paying the full wages which were paid during prosperous times. This being true, we consider it unreasonable and unjust that a demand should be made upon us at this unseasonable moment for an increase in wages, and when thousands are applying for the places occupied by our present employees from all parts of the South, and in many instances from cities of the North.

The Board of Arbitration held a session to consider the street railway controversy on March 7. The street railway presidents refused to answer questions on the ground that the board was not authorized to act, inasmuch as the law provided that the application for arbitration should be made by either or both parties to the controversy, and should be signed in the respective instances by the employer, or by a majority of the employees in the department of the business in which the controversy or difference existed, or the duly authorized agent of either or both parties. When an application was signed by an agent claiming to represent a majority of such employees, the board shall satisfy itself that such agent was duly authorized in writing to represent such employees, but the names of the employees giving authority should be kept secret by the board. In this case it was alleged by the companies that the application was made not by half the employees but merely by officers of the union; on the other hand, the companies had no complaint to make against its employees, so the board was not warranted in acting, and they refused to participate in the proceedings.

The board decided to proceed by hearing the grievances of the men. A number of employees and ex-employees testified that their work was arduous, that they were subjected to unjust treatment and were underpaid.

After several sessions had been held, the consideration of the street railway case was brought to a sudden termination by an injunction granted by the Civil District Court, restraining the board from proceeding further with the investigation.

The application for the writ was made by H. M. Littell, President of the New Orleans City & Lake Railroad Company, and the ground for its issue was that advanced by the representatives of the companies as a reason for refusing to answer questions propounded by the Board of Arbitration. It was alleged that the Board was not proceeding in accordance with the law giving it the power to adjust labor disputes, as under the law the Board could only take cognizance of a complaint when it is brought directly by either employees or employers, and that in the case of the employees it was necessary that the petition setting forth the cause of grievance should be signed by a majority of the employees affected. It was further alleged that, in the present case, neither the railroads nor their employees had brought complaints before the board, but the investigation was being conducted entirely upon a request from the Car Drivers' Union, a third party, having no interest in a controversy between the roads and their employees.

The court was asked to stop the investigation by the board as under the circumstances it would do serious injury to the business of the petitioner.

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FIFTY FOOT RAILS IN ST. LOUIS.

The work of reconstructing the Citizens' line in St. Louis will commence next month. Unusual interest will center in the work, as it is announced that the girder rails to be laid will be 60 feet in length. They will be 7 inches in height and will weigh about 80 pounds to the yard. The joints will be electrically welded.

TELEPHONE COMPANIES VS. ELECTRIC STREET RAILWAY COMPANIES.

BY GEORGE D. FISHER.

In a recent action by a telephone company at Nashville, Tenn., against an electric street railway company to recover damages inflicted upon the former plant by the contiguous plant of the railway company, the telephone company met with an adverse judgment and subsequently appealed to the Supreme Court. The following facts material to the subject were apparent:

The complainant telephone company had established in the city a telephone plant on the single-wire system. The poles upon which plaintiff's wires were stretched were planted in the public streets by permission of the city and by authority of a general statute of the State. The plant was in perfect condition and successful operation, rendering satisfactory service to its patrons, when, as alleged, the defendant street railway company, which had, with one unimportant exception, been operated by animal power, put into operation a single-trolley overhead electric railway system. The latter's action in construction was authorized by general public statutes, which provided that street railway companies might, with the consent of the city authorities, adopt electricity as a motive power. It was alleged that the railway company, in the operation of its single trolley system, generated or collected electricity in such unusual quantities, and applied and used it in such violent, turbulent and varying currents as to produce a non-natural and disturbed condition electrically, not only within the streets, but for the distance of a half mile on either side. The telephone plant was for a time paralyzed and its utility destroyed by the alleged construction and operation of the railway.

The injuries so fatal to the telephone company resulted, as claimed:

First.—By "conduction" or "leakage." Currents of electricity of great strength and force are generated and applied in the propulsion of cars. These abnormal currents overflow the streets and invade private property, finding the earth connections of the telephone wires, pass up into them and the instruments and destroy their utility. This interference was obviated, it is claimed, by the adoption of the McLuer plan, which provides a common return circuit instead of the earth. This adoption was made at a large expense and but for the railway company's wires would have been unnecessary.

Second.—Injury resulted from "induction" or "parallelism" which produced such disturbances as rendered the use of the telephone plant impracticable. But one practical remedy has been discovered for the disturbances caused by induction; that is, to destroy parallelism of the wires of the two circuits. This remedy was practicable for the telephone company alone, and cost the latter a large sum of money.

Third.—Injury resulted from the necessity and consequent cost of erecting higher poles.

The telephone company, having sustained loss in consequence of the construction and operation of the street railway, is the latter liable for loss sustained on account of the causes and conflicts named? The court on these points holds:

First.—That where an electric railway could have reasonably avoided conflict with the wires of a telephone company, but erected its poles on both sides of the street, it is liable to the telephone company for all expenses incurred by it in erecting higher poles to prevent its wires conflicting with those of the railway company.

Second.—In cases where the law permits telephone companies to maintain their lines along a street, provided they do not obstruct the ordinary use of it, then inasmuch as the maintenance of an electric railway on a street is an ordinary use thereof, an electric railway company, whose road is properly built, is not liable for damages to a telephone company, whose wires were first erected along a public street because the force of the current in the wires of the railway company cause so much induction in the wires of the telephone company that the latter cannot be used for the purpose for which they were erected.

Third.—Where a telephone company operates its line by the single-wire system, in which the earth is used as the return conductor at the exchange and the houses of subscribers, and the electric current required for its business causes no hurtful disturbances of natural electrical conditions, and where an electrical railway company operates its road by the single-trolley system, in which it also uses the earth as a return conductor, but generates electricity in such unusual quantities and applies it in such violent and varying currents as to produce an unnatural and disturbed electrical condition, whereby the utility of the telephone system plant is destroyed, because the more powerful currents generated by the railway company by conduction, invade the telephone exchange and the houses of subscribers, then the railway company is liable to the telephone company for damages to its business.

Fourth.—A telephone company whose line is in operation is not bound to protect itself from the probable injurious consequences to it, from the building of an electric railway by making such changes in its existing plant as would obviate the effects of conduction.

COMMENTS.

It will be observed that the Tennessee court holds the street railway company liable on all points except that of "induction." It is an established fact that streets are dedicated to the purposes of travel. This being the primary use of a public highway it is not unreasonable to cast the burden upon the telephone company to protect itself from the injurious consequences by making, at its own cost, such changes in its pre-existing plant as would obviate the effects of "conduction," etc., of a system of electric railways, a necessity as well as a natural use of the streets for the convenience of the public. The New York Court of Appeals (32 N. E. R. 148) holds that an electric railway company has an equal right with the telephone company to make use of the law of nature, and a paramount right to make use of the street for carrying passengers. If damages are allowable in such cases, electric railway companies will be subjected to a multiplicity of suits on numerous pretexts. The street railway's use of the street is the dominant use for a proper street purpose, and while the telephone company had a lawful and permissive use it was nevertheless not a street use proper, and should not be heard to complain because its occupancy is subordinate to any street use to which the city might wish to devote the streets. Hence, when a city undertakes to use them for electric railway purposes it cannot be hindered in doing so, nor can a telephone company claim damages for such use, authorized and directed by the city. The concession or determination that the electric railroad use is a proper street use is conclusive of that question, and neither the city nor the company can be made by a telephone company to select one side rather than the other of the street for erecting the poles, or pay damages if it does not do so. The Ohio Supreme Court in the case of Street Railway Company vs. Telephone Association, 48 Ohio, St. 390, it was held that the paramount use of the street was for travel, and that telephone companies could not obstruct the path of progress, and debar the public of so great convenience as that of rapid transit. The right to erect poles includes the right to erect them anywhere they may be properly erected, at the discretion of the city. The railway's use being a street use, the telephone company's rights, in subserviency thereto, must yield to the claim of the city and the street railway for street service.

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Brooklyn, N. Y.—The trial of President Benjamin Norton, of the Atlantic Avenue Railroad, for alleged violation of the ten-hour law, was set down for March 13 in the Court of Sessions in Brooklyn, but has been postponed to March 25.

NEW YORK RAPID TRANSIT.

Ex-Mayor Abram S. Hewitt, of New York City, who was one of the committee of five experts appointed to examine the plans and estimates of the Rapid Transit Commission, does not believe in delaying all improvement in local transportation facilities until the proposed underground railway system is constructed. In his opinion the utilization of existing agencies in a liberal way will have the effect of giving a large measure of rapid transit. In a recent public statement he expressed these views:

"I believe that the Manhattan Elevated Railroad system, occupying four of the best avenues of the city, and controlling lines which extend the length of the island and into the annexed district, is capable of much greater development than it has reached. I also believe that if the opportunity presents itself the Manhattan Company stands ready to push its lines to a greater development. The rate of speed attained by its local trains now does not extend 12 miles an hour. That is not rapid transit. An attempt was made on the Ninth avenue line to provide an express service by means of a third track, but it was inadequate because of the interference with the local trains. It was an indication, however, of the way in which immediate rapid transit may be secured. I believe that if each of these lines were provided with four tracks, two of them might be devoted to rapid transit without interfering with the local trains. Taking into consideration the great delays in constructing an underground road—even if the Legislature should grant the Commission the right to expend an additional $5,000,000—and the uncertainty of finding a lessee who can qualify in the required amount of bonds, I firmly believe that the Commission should avail itself of the facilities offered by the present roads and give the people of this city immediate rapid transit.

"I don't want to be misunderstood as saying that this is a final solution of the problem by any means. New York is growing rapidly, and it may increase as much in the next 20 years as it has increased in the past 20 years. We want ultimately the best system of rapid transit that can be devised, but in the mean time we want the best rapid transit that is feasible now. The committee of experts found that the Manhattan Elevated Railway could be developed to give such rapid transit. The effective capacity of these lines can be doubled. At the outset the much-needed relief may be obtained by the addition of a third track. In the morning, when the pressure of traffic is southward, the express trains would start at the north end of the island upon the Sixth and Third avenue lines thus provided with a third track and run independently of local trains to South Ferry, where they could be transferred to the third track of the Second and Ninth avenue roads and run north as express trains. This process could be reversed in the evening, when most of the pressure is northward. The details of this proposed development of the elevated were presented to the Commission, and the suggestion was rejected on the ground that in some way it might deter bids for the new line laid out by them. This view begs the whole question. We want rapid transit, and we want it now if it can be provided. The Commissioners should have the courage to provide it in this way if it can be done.

"I believe that the Manhattan Elevated Road, if developed, and the New York Central, if it will co-operate, are capable of furnishing us rapid transit for some time to come. The New York Central would be a responsible lessee for an underground road from City Hall Park to Forty-second street. Then, as the demands increased, branches from this line might be thrown out, and in time the system would be completed. As for the elevated railroad, either its lines should be improved or strengthened, or they should be taken out of the streets altogether. They should be made adequate or done away with. I believe that the company would be willing to make them adequate."

STREET RAILWAY ACCIDENTS.

A very large proportion of the persons killed or injured by electric cars in Brooklyn have been children. No matter what the rate of speed may be children are injured, and in very few cases are the accidents to be attributed to any cause except the heedlessness of the victims. President Lewis, of the Brooklyn Heights Railway, recently made this suggestion:

"Most of the accidents occur to children. Now, in some European cities, where they have gone through the experience that we are having here, regulations have been made requiring the children to keep off the streets where the tracks are. The police see that the law is enforced, and children are compelled to play on the side streets.

"If we had such a law here the police would quickly learn to enforce it, and the children would not be allowed to play on the thoroughfares where cars run. I think that would prevent a great many accidents.

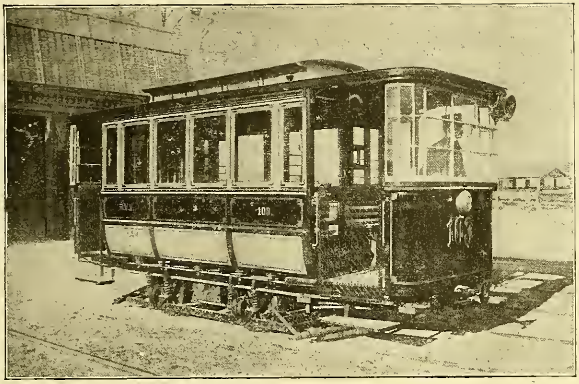
"When you look at it, we have not had so very many accidents. During 1894 we carried 100,000-000 people, and yet we killed only 8. It is true that during the first year, after electricity was introduced, many people were killed, but the number has been constantly decreasing since.

"I notice that many more accidents occur during the winter than in the summer time. This is due, in a large measure, to the fact that the tracks are slippery and the cars cannot be stopped easily. Another thing is that closed cars are run in the winter time. On the open cars in summer people have a good view on all sides and keep out of danger. I think that it is a mistake to close the platform on the track side of the car. This is responsible for a great many accidents.

"The cars are not run too fast, except in rare instances. A motorman who runs his car too fast should be arrested and punished. The too high rate of speed is responsible for only a very few of the accidents. But the great thing is to keep the children off the streets."

ELECTRIC STREET RAILWAYS OF BUDAPEST.*

It is singularly interesting at this time, when the electric street railway system of Brooklyn is under close scrutiny, to turn by way of comparison and contrast to the electric street railway system of another city so far from Brooklyn that it has reached its own results by processes which have come in no wise under American influence. The Electric Street Railway Company, of Budapest, Hungary, opened its first line five years ago. It has steadily increased the number and extent of its lines, and is operating them to-day with what is locally considered to be a very high degree of success. When the Brooklyn horsecar system was permitted to change its motive power to electricity, the chief objections that were urged were directed against the use of the overhead trolley wires, which required the erection of poles in the streets and the suspension of a network of highly-charged wires, under circumstances which might prove in many ways to be both inconvenient and dangerous. But it was stoutly declared that no other electric system except the overhead trolley could be made to work, and the desire for more efficient transit carried the day.



WINTER CAR IN USE IN BUDAPEST.

Meanwhile, far down the valley of the Danube, the municipal authorities of Budapest, a place with half a million inhabitants, had absolutely refused to permit trolley wires in the handsome and orderly streets of their progressive city; and the directors of the Budapest Electric Street Railway Company, desiring a franchise for the new boulevards, cheerfully undertook to dispense with all overhead structures.

RING STRASSE LINE AT THE CROSSING OF ANDRASSY STRASSE, BUDAPEST.

In short, the proposed system was a highly improved underground trolley, with the live wire or metallic strips so placed as to be neither visible or tangible, and insulated in such a way that the surface rails could never be dangerously charged, while telegraph and telephone lines should suffer nothing from induction. This brief description of the system is not for technical electricians, but for the unscientific reader. It is sufficient to say that it has stood the test of five winters and five summers with perfect success. Nor is there any reason whatsoever to believe that it would not be quite as successful in Brooklyn or in any American city as in Budapest.

The plain truth seems to be that, apart from the power houses, which take the place of horses and stables, the ordinary trolley system is an exceedingly inexpensive affair. It cost only a trifle to erect the poles and string the wires. But it involves some expense to adopt the Budapest system and carry the wire underground. The expense of subsequent operation is likely to be less rather than more with the Budapest system; but the initial expense of converting a horsecar system into an electrical system would obviously be much increased.

But over against this objection it may be urged that the Budapest system actually pays very well. Last year its stockholders received a dividend of 8 per cent., a good round payment was made to the municipal treasury as a rental for the use of the streets, and something was added to the reserve fund. It should be remarked that the accounts of the Budapest Electric Street Railway Company are as public as the accounts of any of the municipal departments, and that every feature of its income and outgo is open to the inspection of the whole world.

The street railway business in a European place like Budapest, even if fairly profitable, is not nearly so lucrative as in an American city. The reason, then, why it was so easy for the Budapest company to earn 8 per cent. last year over and above its large tax account, its contribution to an insurance fund for its employees, its liberal payment to a reserve tax fund, its satisfactory payment also to an ordinary reserve fund, and its provision for interest and sinking fund, is readily understood when it is stated that 4,000,000 florins, or $2,000,000, is the sum-total of its capitalization. An American street railway company would scarcely have been content to construct this Budapest system without watering its stock to the extent of a capitalization of from $10,000,000 to $20,000,000. The Brooklyn street railway companies, or other companies similarly situated in the United States, could easily adopt the Budapest system for the central portions of the town, and earn 25 per cent. dividends upon their actual investment. But unfortunately our American companies as a rule wish to earn a large rate of interest upon an enormously inflated and fictitious capitalization.

There is nothing in the climatic conditions of Budapest which makes it easier to operate this underground system there than it would be in almost any American city. The fact that Budapest experiences heavy snowfalls is suggested by an illustration, which represents the electrical snow sweeper. The further fact that Budapest winters are cold is also suggested by the inclosed platform of the winter car, which protects the motorman behind glass windows.

The illustration of the car shows the kind of fender in use—with padded edge and with spiral spring connections—that renders it altogether impossible to crush pedestrians under the wheels. We are not aware of any complaint in Budapest on the score of accidents of the kind that have been so frightfully common in Brooklyn. The speed of electric cars in Budapest is carefully regulated, and the regulation is strictly enforced. In the central parts of the town the rate of speed is considerably less than that which has been customary in Brooklyn.

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* Abstract of an article in the *Review of Reviews*.

Along the Andrassy street, which is considered by many critics to be the finest modern avenue in Europe, no street railway has yet been permitted to lay its tracks. The Electric Street Railway Company, and its rival, the horse railway company, which has lines on many streets, have united in applying for a joint franchise under which they propose to construct and operate an underground electric railway beneath the surface of the Andrassy street. At last advices, the matter was under municipal advisement, with the prospect that the municipal council and the joint local transit systems would soon agree upon satisfactory detailed plans for an underground road, and also upon the terms of an equitable charter. A millennial anniversary is to be celebrated at Budapest in the early future, and it is hoped that this underground line may be completed and in operation in order to facilitate the movement of passenger traffic during the celebration. It may be assumed as altogether probable that the Budapest underground line—extending from the heart of the city into the most desirable suburban district—will be a model of its kind from every mechanical and engineering point of view, and that the municipal council will reserve the proper measure of control over it as pertaining to an essential public service, while the two companies which join in the enterprise will carry it through on sound financial principles.

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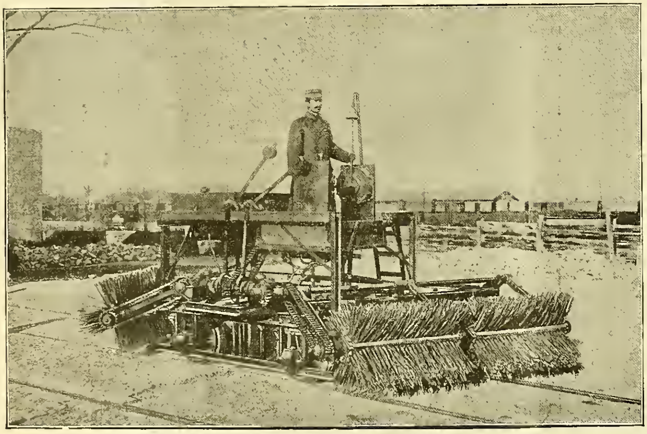
MUNICIPAL CONTROL OF STREET RAILWAYS.

A meeting was held in Brooklyn the other day for the purpose of considering the bill, now before the legislature, allowing municipal ownership of street railroads in this city, Brooklyn and Buffalo, if the voters decide that they are in favor of it. The meeting was under the direction of the Social Reform Club of this town, and most of the speakers were from this side of the river. The meeting passed resolutions attacking corporations and approving warmly the bill for municipal ownership.



ELECTRIC SNOW SWEEPER USED IN BUDAPEST.

Probably a good deal of the feeling in favor of municipal ownership which was manifested at the meeting was mere unreasoning sentimentality due to the recent strike. The railroads were rich, the men poor; therefore we are against railroad corporations and want Brooklyn to conduct her own railroads. That seems to be the reasoning followed unconsciously by a number of semi–Socialists, clerical and lay. But how will city ownership stop strikes on the city's lines? The only means of preventing strikes will be to pay the employees fat, round salaries, such as are given to policemen and firemen. A pension system will naturally ensue. The reduction of fares will be the next step. Free transportation the next. The interest account for the purchase or construction money, the increase in operating expenses, and the decrease or total absence of receipts will give the taxpayers of any city, which goes into the railroad business, something to think about for a good many years. Leaving free transportation out of consideration, the expense will be a big liability for any municipality to saddle; and if it tries to run the roads at a profit, the strikes and losses of the old system will reappear:

Reforming things by resolution is a mighty easy job.

Also, considering that our great cities have not yet shown any satisfactory ability to govern themselves, and manage their own business, what reason is there to believe that they can be any more successful in owning and managing the the street railways?—*New York Sun.*

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THE BOSTON SUBWAY.

The Pennsylvania Steel Company of Steelton, Pa., has been awarded the contract for the steel work for the subway in Boston, through which trolley cars will be run in the crowded districts of the city. The first section of the subway will be 2,000 feet long, under Boston Common, and will contain 2,000,000 pounds of steel. This contract will keep Steelton mills busy nearly all summer.

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STORAGE BATTERIES IN AN ELECTRIC RAILWAY POWER STATION.*

The electric street-car railway from Zurich to Hirsladen differs from all other street railways from the fact that in the generating station itself secondary batteries are used to equalize the load upon the machines. It was at first intended to use machines only, but the responsible contractors for the work, who were the Maschinenfabrik Oerlikon, after being approached by the Hagen accumulator works, made satisfactory preliminary tests and eventually decided to use secondary batteries. The generating machine is shunt-wound, and the battery is in parallel with it across the mains. Thus a constant load is obtained upon the engine, which works at its highest efficiency. There are special automatic cell-regulator switches which are controlled by the potential and the dynamo therefore charges a varying number of cells. The cells which lie between the charge and discharge points are charged by a small auxiliary shunt machine, and the field magnet coils of the latter being across the leads to this varying number of cells, automatic control of the dynamo is obtained. Automatic magnetic cut-outs are used in the circuits to prevent the current from the cells driving the dynamos as motors.

The conductor is carried on poles and is divided into four parts insulated from one another. The road is of meter gage and is 2.8 miles long, with only 233 yards of level line. There are 3,300 yards of gradient varying from 0.15 to 3%, 880 yards varying from 3 to 5%, and 543 yards varying from 5% and above. The steepest grade is 6.48%, which is in the Klosbachstrasse, and is 87 yards long, while it has a curve of 27.2 yards radius at the end.

From the power station up to the Kreuzplatz, a distance of 4,950 yards, the sum total of all the rises gives 124 feet, which is an average rise of 0.837. In the contrary direction the total of all the rises is 210 feet, which gives an average rise of 1.41%; the average rise, therefore, in each direction is 1.127. Each carriage is built for 12 persons sitting, and 12 to 14 persons standing. The weights are as follows:

	Lbs.
Car empty	5,050
Weight of electrical apparatus	3,200
Weight of passengers, driver and conductor	3,960
Total	12,210

The greatest output of energy is required in the Klosbachstrasse, where, as stated, the gradient is 6·48 per cent. With a coefficient of traction of 26·4 pounds per ton, and a speed of 10.8 feet per second, the work required is 18.8 H. P. at the motor. In order to be able to start, 25 H. P. must be available. If it be allowed that the average load of the car is only 1,320 pounds, which is a low estimate, then the average total weight moved is 9,570 pounds.

The single journey lasts 26 minutes, and with 2 minutes' stop at the end the double journey occupied 54 minutes. The author estimates that the average output of the motor is 4.72 H. P. allowing for 25 per cent. excess at starting. The power station is at the end of the line, and provided with two Galloway boilers, built by Messrs, Escher Wyss & Co., of Zurich. Each boiler has a heating surface of 624 square feet. One boiler acts as a reserve. There are two steam boilers, each of 90 H. P., but capable of developing 100 H. P., and one small engine of 5 H. P. Each of the two large engines drives by belting a shunt-wound dynamo, which develops from 450 to 550 volts and 100 amperes. Only one set is at work at one time, so that there is one always in reserve. The small engine-driver directs a shunt-wound dynamo, developing 100 volts and 30 amperes, or 150 volts and 20 amperes; this is the auxiliary machine previously alluded to, and it has been found that it need only be worked once in two or three days for some hours. The station is so arranged that as much more power could be put in, giving three times the output, with a complete set in reserve.

The batteries are placed between the boiler-house and the engine-house, and consist of 300 cells, with a capacity of 245 ampere-hours; the charging current is 63 amperes and the normal discharge 81 amperes, but this rises to 162 amperes, and on emergency 243 amperes can be taken out. The charge is sufficient to carry on the whole work of the line for three hours.

The special automatic double switch is designed for 150 amperes, and to control 28 groups of three cells each; it moves over two contacts per second, and. therefore, can switch in or out 84 cells in 14 seconds. There is a six-minute interval car service, and also a 12-minute interval service; with the former nine cars are on the road together and with the latter five cars.

If the efficiency of the dynamo, allowing for loss in the belt, be taken at 90 per cent., an average loss in the conductors of 5 per cent., the efficiency of the motor and apparatus at 80 per cent., and the loss in the accumulator at 5 per cent., then the total combined efficiency will be 64.98 per cent. Taking the average output per car at 4.72 H. P., then the steam engine must develop about 65 H. P., for the 6-minute service, and about 36 H. P. for the 12-minute service. The current at 520 volts will be 83 amperes for the 6-minute service, and the result is that about 80 amperes are constantly given out by the dynamo, while there is a varying effect on the battery from 30 amperes charge to 30 amperes discharge, the line current required varying between 50 and 110 amperes.

From 6:16 A. M. to 7:04 A. M. there is a 12-minute service, from 7:04 A. M. to 7:58 P. M. a 6-minute service, and from 7:58 P. M. to 9:04 P. M. a 12-minute service. This gives a 6-minute service for 12 hours 54 minutes, and a 12-minute service for 1 hour 54 minutes. The total daily output is therefore 907 brake horse power hours, and as 2,960 pounds of coal are consumed, there is a consumption of 3.3 pounds of coal per brake horse power hour. In power stations, where no accumulators are used for street car service, the author states that 5.5 pounds of coal and upwards per brake horse power hour are used, so that there is a daily saving of 2,000 pounds of coal; and. with coal at 31s. per ton, this is a yearly saving of £516 due to the use of the battery.

The battery and switch apparatus complete, erected in working order, cost £1,480, so that yearly one-third of this is saved in coal; allowing 5 per cent. for sinking fund, and 5 per cent. for repairs, the battery would be paid for out of coal savings in four years. One of the chief advantages, however, is that it is unnecessary to keep the second boiler under steam. The author also points out that the coal consumption will hereafter be diminished, as the engines are at present working non-condensing, but when the work is finished completely they will work condensing, and he thinks it clearly proved that the use of the accumulators is a great advantage for street-car service.

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*From Elektrotechnische Zeitschrift, 1894, p. 356; in "Abstracts of Papers," Institution of Civil Engineers.

PROTEST AGAINST THE TROLLEY MAIL SERVICE IN BOSTON.

Several of the labor organizations in Boston have adopted resolutions protesting against trolley mail service on the west end roads. The experiments that have lately been made demonstrate that so great a saving of time is effected when the mail is carried on the cars instead of on the lumbering mail wagons that it has been generally assumed that a contract with the West End Company would be entered into by the government. To prevent such action some of the labor leaders decided to call a mass meeting in Fanueil Hall to protest publicly against the electric car mail service. One of the officials of the West End Company is quoted as follows regarding the matter :

"We have given the matter no attention whatever," said he. "It makes very little difference to us what our employees do, as we shall go ahead with our negotiations with the Government just as if the protest had not been made. If the postal authorities should bring me a contract to sign this afternoon I would, without the least hesitation, attach my signature to it. I cannot see why we have not the same right to enter into a business agreement with the Government as we have with a private individual or a private party which wishes to hire one or half a dozen cars of us. If our service is satisfactory to the authorities at Washington all they have to do is to present the necessary papers and our signature will be immediately attached to them.

"No less than 56 cities throughout the country have entered into contracts with the postoffice department for the carrying of mails, and this is the first instance, so far as my knowledge goes, where a protest has been made. If it is shown that we can transport the mails at a great saving of time, thus benefiting the entire business community and at the same time facilitating the work of the department, it seems to me that all right-minded persons should do all they could to further the project—not to prevent its consummation. I cannot believe, notwithstanding that the Faneuil Hall meeting has received the sanction of the Motormen's and Conductors' Union, that a majority of its members indorse this movement. I don't understand that even a serious grievance against us presents sufficient cause for our men to obstruct a transaction that means so much to the public. I have a higher opinion of the rank and file of our employees to think they would use their influence in thwarting a measure that is for the general good, no matter what their feeling toward us might be.

"The underlying motive of this whole business relates to the possibility of a strike movement. In case of so deplorable an event, it would not be judicious for the leaders to interrupt the cars carrying the mails, and it is thought that if these cars were allowed to run we might hoist mail flags on all our cars and thus defeat the cause of the men. It is hard at this time to foretell what we would do in the event of a strike, but I can say that we would use all legitimate means to keep our cars moving."

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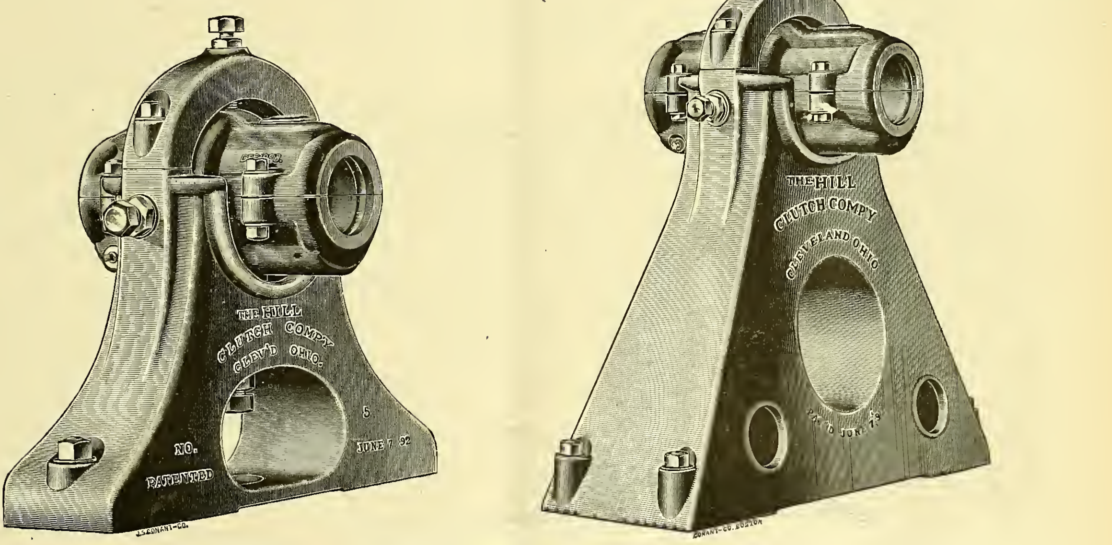
NEW SELF-OILING BEARING.

A new self-oiling bearing has recently been introduced by the Hill Clutch Company of Cleveland, O. As may be seen from the illustrations the bearing and stand are constructed in the most substantial manner, and they possess decided advantages in the way of adjustment for keeping the shaft in line which are effected by screws and are very simple. The bearing is perfectly adjustable, as it has a ball and socket adjustment, as well as the vertical and lateral screw adjustments. In the bottom part of the bearing are three oil wells, one at each end and one in the center ; these are divided by a low partition over which the oil flows from the end wells into the center one, the dirt and heavy oil settling in the end chambers, from which the sediment can be drawn off. In the top or cap of the bearing are two oil wells, which are filled and kept so by means of a collar. The oil is fed in the shaft through small openings in the bottom of the wells as well as on each side of the collar, thus insuring thorough lubrication of the journal. The construction of the bearing is such that it cannot leak, and as there is no waste of oil it is an economical bearing to operate. One of the most important features in the use of this bearing consists in the fact that all thrust collars are done away with. In each bearing there is a split collar which is made to clamp the shaft very tightly, and not only acts as an oil pump to carry the oil from the bottom well to those in the cap of bearing, but as a thrust collar, thus doing away with all outside collars, which are more or less dirty, as they must be oiled to prevent their cutting or heating the bearing, and the oil is thrown around over the floor. With the Hill Clutch Company's bearing this does not occur, for the thrust collar being inside of the bearing it cannot throw any of the oil on the floor, and as it runs in oil it does not heat or cut the bearing. Some of these bearings now in use support nine-inch shafts running at 450 revolutions, and others support 14-inch shafts where the speed is 240 revolutions per minute. In both cases the bearings are giving the best of satisfaction.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SELF-OILING BEARING AND STAND

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Baltimore, Md.—The Baltimore Traction Company has begun running electric cars over the Gilmor street line, heretofore operated by cable.

OVERHEAD CONSTRUCTION FOR THE BALTIMORE BELT LINE.

The work on the overhead construction for the Baltimore Belt Line, on which the electric locomotives now being built by the General Electric Company will be operated, is now well under way. The poles which are being put in place are made of rolled steel lattice work and are about 30 ft. in height, tapering from base to summit. A heavy truss, extending across the tracks, will connect each pair of poles, which will stand about 150 ft. apart along the railroad. From one truss to another over each line of rails will be a longitudinal truss, carrying the steel troughs which are to convey the current to the trolley of the huge electric locomotives. The feed-wires will be of extra heavy copper and will be connected here and there, as in the case of street railways, with the steel trough which communicates the current direct to the sliding-shoe of the trolley. This arrangement will be like an inverted conduit swung in mid-air from the trusses, insolation being secured by thick pieces of porcelain, tumbler-shaped.

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INVESTIGATING THE BROOKLYN STRIKE.

The Friday legislative committee appointed to investigate the Brooklyn Street Railway Strike has been holding sessions in Brooklyn this week, but little of interest was developed. The story of the strike was told and retold, but no new facts of importance were brought out. R. J. Moses, counsel for the strikers, one of the witnesses, made a somewhat remarkable statement regarding the speed of electric cars. He presented 89 affidavits concerning excessive speed of trolley cars. The highest rates traveled were on Myrtle avenue, 1,300 feet in 26 seconds, or nearly 36 miles an hour, and 31 miles an hour on Ninth avenue. Mr. Moses thought that accidents were caused by motormen hurrying to their meals and in making up time lost by blocks.

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White Plains, N. Y.—The New York, Elmsford and White Plains Railway Company has accepted the franchise granted by the Board of Trustees to operate an electric street railroad through the village. The company already has a franchise from the town of Greenburg to build from Elmsford, on the New York and Putnam Railroad, to the village line. The road, it is stated, will eventually connect the Hudson River, Putnam, Harlem, and New Haven railroads, besides connecting with the extensions of the Yonkers and Huckleberry electric roads, as well as the roads recently organized to operate along the Sound.

COMMENTS AND VIEWS OF COMTEMPORARIES.

Steam and Electricity.—In the competition between the steam railroads and the electric railroads in Connecticut, may the better power win! It will win, for sure, in the long run, whatever the Railroad Committee of the Legislature of the State of Connecticut may do to favor or to obstruct the competition. Let there be a fair field for both steam and electricity.—*New York Sun.*

Obstruction of Street Railway Tracks.—If the public is to be accommodated the roads must be allowed to have the unobstructed use of their tracks. The number of people who ride in carriages is small in comparison with the number that patronizes the street cars. The city ordinance discriminates in favor of the convenience of the greater number. It is just and it should be enforced.—*Brooklyn Eagle.*

Fenders in Baltimore.—Up to the present time no one has been killed in this city by a trolley or cable car which was provided with an approved fender. Persons have been struck by the cars, and picked up unhurt. Only yesterday a very heavy woman was struck fairly by a car, fell into the fender, and escaped uninjured, continuing her walk as if nothing had happened. In other cities the trolley slaughter goes on unchecked. —*Baltimore Sun.*

New York and Brooklyn Street Cars.—If any little, gone-to-seed, way back town of 10,000 people had such horse cars as you find running in most of New York, that town would be a by-word for the whole country. Come and live in Brooklyn if you want street car service. Whenever the hired men allow our cars to be run they are run with reasonable promptitude and are kept clean and attractive. When they become so rickety and shambling and shabby that the companies are ashamed to run them longer, they are taken to New York apparently.—*Brooklyn Eagle.*

Rural Trolley Lines.—What the great railway lines have done in developing wide stretches of country the trolley lines are doing for neglected and underpopulated areas near considerable cities. When a capitalist in Pennsylvania was asked to subscribe to the capital stock of a projected trolley line between two towns he took the trouble to learn the number of local passengers daily on the railway that already connected the places. He found that the average was but 25 and declined to go into the trolley scheme. The trolley is now in operation, and its passenger service promises to be extremely profitable. The cautious capitalist had not counted upon the seduction of five-cent fares to the community living along the line, and did not suspect that a trolley ride would become a popular form of amusement.—*New York Sun.*

Freight Service on Electric Lines.—There is something suggestive in the fact that the Massachusetts Street Railway Association has petitioned the Legislature of that state for permission to carry freight as well as passengers on its cars. It may be considered a step toward the use of electric roads for the transportation of freight and passengers beyond the limits of cities. There is no reason why this should not be done, especially between cities and suburban towns. Already we have an illustration of it in the case of the electric line connecting Denver with Golden. The day may come in a few years when large cities in this country will have electric lines connecting them with the surrounding country. In this way Denver may secure connection with all the important towns of the northern part of this state.—*Denver Republican.*

Street Railway Accidents.—The dirty streets, from which a slimy mud is spread over the tracks, are blamed for the accidents, but there are other reasons. The motormen, growing more familiar with the handling of their cars, are also more careless and venturesome. They run at high speed, calculating to stop in a car's length, and when the car slips on the track they are helpless to stop it. This develops the special danger attending the mistaken rule requiring a stop at the near crossing. If the public understood that cars would cross the streets without stopping they would be on the lookout for them, but, knowing the rule and seeing the motorman applying the brake, they are misled into crossing only to find that the car is slipping on the track or that the motorman does not intend to obey the rule.—*Philadelphia Public Ledger.*

New Charge Against Street Railways.—The charge is made that street car companies sprinkle their tracks, not with selected sand, nor even with clean earth, but with the product of excavations from old cellars and demolished houses and of accumulations on vacant lots, wherever it can be the most easily or most cheaply obtained. Such material, of course, is liable to contain the worst forms of infection. In the nature of things, it must contain infection. The systematic scattering of such material along the city's most populous streets—to be comminuted by traffic and then redistributed in the form of impalpable powder by winds into eyes, throats, lungs, upon clothing and into stores, restaurants, habitations and sleeping-rooms—plainly might become one of the most fertile means for breeding all manner of epidemics. Here is a subject heretofore largely overlooked that is well worthy of the utmost attention of the health authorities, and, if need be, of stringent additional health legislation.—*New York Telegram.*

FINANCIAL NOTES.

Bonds to Be Issued in New Orleans.—At a recent meeting of the stockholders of the Orleans Railway Company, of New Orleans, it was voted to issue $300,000 6 per cent. gold bonds. The money from the sale will be utilized for equipping the road for electrical operation.

Lynn & Boston Earnings.—President Breed, of the Boston & Lynn Street Railroad Company, is quoted as saying that the earnings of the company so far this year are considerably in excess of those of last year. The earnings for February are between $9,000 and $10,000 ahead of the corresponding month last year.

North Chicago Electric Bonds.—A first mortgage for $1,000,000 from the North Chicago Electric Company to the Illinois Trust and Savings Bank was filed for record in the Recorder's office in Chicago last week. The mortgage, which is dated Aug. 1, 1894, terminates in 20 years. One thousand bonds of the value of $1,000 are to be issued, with interest at 6 per cent. per annum.

Staten Island Railway Sold.—The defunct Belt Line Railroad, which ran along from Fort Wadsworth to Clifton, and then to Howland Point to Northfield, Staten Island, has been sold by a referee to satisfy a claim against it. The entire road, including the franchise, was purchased for $75,000 by the Thomas syndicate, which is now trying to get franchises for trolley roads.

New Bonds in Baltimore.—The Edmondson Avenue, Catonsville & Ellicott City Railway Company, of Baltimore, Md., has placed a trust mortgage deed on record to the Maryland Trust Company, to secure the issue of $500,000 in first mortgage bonds, the proceeds of which are to be used in constructing the road, which is a part of the Washington & Maryland Railroad line.

Chicago Electric Transit Bonds.—The Chicago Electric Transit Company has filed with the County Recorder a first mortgage to the Illinois Trust and Savings Bank. The mortgage is dated Aug. 1, 1894, and the consideration is $2,000,000, to be issued in bonds of the value of $1,000 each. The principal is papable Aug. 1, 1914, and the interest at 6 per cent. per annum is payable semi-annually.

Tenallytown Railway in New Hands.—The negotiations for the purchase of the Georgetown and Tenallytown (D. C.) Railway have been completed, and the new owners are in control. The officers are: O. T. Crosby, of New York, President; C. A. Leib, New York, Vice-President; H. F. Purdy, New York, Secretary and Treasurer. Directors, O. T. Crosby, C. A. Leib, H. F. Purdy, H. F. Clark, Washington; George E. Emmons, Washington; H. Bradley Davidson, Washington; T. C. Daniel, New York; J. Hite Miller, Washington, and H. M. Earle, Washington.

Grand View Beach Road at Charlotte, N. Y., Sold.—The Grand View Beach Railroad, which extends from Charlotte, near Rochester, N. Y., to Manitou Beach, was sold on March 5 to a syndicate for $31,000. The railway was built in 1890 by a company with a capital stock of $100,000, and the road was bonded for $200,000. The company has met with difficulties from the start, and although the trip is a very attractive one the travel was not sufficient to pay running expenses. Then came a fire which destroyed the power plant, and this proved a heavy loss. Last year the company defaulted in the payment of the interest on the bonded indebtedness, and the action in foreclosure was commenced a few months ago.

Probable Consolidation in Mobile, Ala.—For some time past negotiations have been in progress between the representatives of the Mobile Light and Railway Company and the Mobile Street Railroad Company, looking to the consolidation of the road of the first named company with the last named company, of which R. Semmes is General Manager. J. Howard Wilson, of the first named company, says that, while the negotiations are merely preliminary, he is of the opinion that they will result in a consolidation. "If these two excellently constructed and ably managed companies unite, Mobile will have a street railway system which will be—the size of the city considered—one of the best in the country," says the *Register*, of Mobile.

Long Island Traction.—The committee of stockholders of the Long Island Traction Company in Brooklyn, which was recently appointed to devise some plan of relieving the company from the financial difficulties in which it is involved, has submitted a report. The committee says that owing to losses by reason of the recent strike and other causes $400,000 will be required on April 1 to meet the rental of the Brooklyn Heights road and other obligations, and that $100,000 additional will be required on July 1. It finds that there is no available property or credit on which to draw for the money. The committee recommends that the stockholders of the Traction company put up $2 a share on or before March 23, and that the company be reorganized with a much smaller capital and that it issue 5 per cent. bonds.

North Chicago Figures.—Just about one-third of the total business of the company was done by the horse car lines. But it has cost practically as much to do that business as it has to do twice the amount with the cable. The receipts of the cable lines were $1,980,000, and of the horse car lines $1,032,000, while the expenses of the cable were $711,000 and the expenses of the horse car lines $701,000. If there should be an increase of 50 per cent. in the traffic of the horse-car lines owing to the introduction of electricity those lines would earn, say, $1,550,000 at an expense of, say, $750,000, making their net earnings $800,000, against $330,000 when operated by horses. It is safe to say, if this basis of calculation is at all correct, that there will an increase in the net earnings of the company as a result of the adoption of electricity of something considerably over $400,000.—*Chicago Tribune.*

NEW INCORPORATIONS.

Murphysboro, Ill.—The Murphysboro Street Railway Company has been incorporated; capital stock, $11,000; incorporators, Thomas M. Logan, A. F Minton and S. W. Ward.

Greensburg, Pa.—The Council at Irwin has granted a franchise to the Greensburg, Jeannette and Pittsburg Electric Street Railway for the right of way through the town.

New Britain, Conn.—The board of selectmen has granted the Central Railway and Electric Company leave to extend its system to the town line at the points petitioned for.

Savanna, Ill.—The City Street Railway Company has been incorporated with a capital stock of $25,000 by W. W. Cargill, James S. Canterbury, Edwin B. Magill, A. D. Appleby and B. Pulford.

Webb City, Mo.—The Joplin and Galena Electric Railway Company has been incorporated with a capital stock of $120,000. The promoters are Galen Spencer, A. H. Waite, of Joplin, Mo., H. H. Harding, Carthage, Mo.

Kittery, Me.—The Lathrop Car Fender Company has been incorporated, with a capital stock of $100,000. The promoters are: Thos. Lathrop, Brookline, Mass.; Wm. A. Root, Roxbury, Mass.; Frank H. Adams, Somerville, Mass.

Jersey City, N. J.—The Ironton Electric Railway Light & Power Company has been incorporated with a capital stock of $300,000. The promoters are: Lucius C. Ryce, Plainfield, N. J.; Geo. L. Shearer, T. Channon Press, New York, N. Y.

Birmingham, O. — The Milan, Birmingham & Elyria Electric Railway Company has been incorporated with a capital stock of $100,000. The promoters are Geo. W. Clary, C. P. Baker, H P. Starr, H. D. Olds, W. L. Fay, F. Burk, E. H. Andress, C. A. Btistol.

Baltimore, Md.—The Baltimore, Severn Park & Annapolis Railroad, to be operated by electricity, has been incorporated by G. Howard White, Dr. Robt. B. Johnstone, Robert Dungan, Arthur M. Easter, B. F. Simmons and David Collett. The capital stock is $100,000.

Fishkill, N. Y.—The Fishkill Electric Railway Company has been incorporated to build and operate a street surface railroad from the village of Matteawan to the village of Fishkill; capital, $50,000, and directors: John T. Smith, E. K. Tompkins, Charles H. Watson, John Place, W. Weston, B. L. Smith of Fishkill-on-Hudson; S. K. Phillips, W. H. Southard of Matteawan, and Wilbur H. Weston of Newburgh.

Charleston, W. Va.—The Charleston Street Railway Company has been chartered to build a line to connect Charleston with West Charleston, and to take in the new town of Elk City, recently included in the corporate limits of Charleston. The line will be about five miles in length, and will be equipped with electricity. The incorporators are all Charleston people. Work will begin not later than April 1.

Waterville, Me.—The Farmington, Waterville & Wiscasset Railroad Company has been incorporated by H. B. Goodenough, of Brighton, Mass.; V. B. Mead, of Boston; N. B. Beal, of Phillips; W. F. P. Fogg, of Waterville; P. H. Stubbs, of Strong; Daniel M. Bonney, of Farmington; N. Harding, of New Sharon, and Thomas Sampson, of Winslow. The company proposes to build a road running through several towns from Waterville to Farmington. The capital stock is $100,000. The company is authorized to use steam or electricity.

Philadelphia, Pa.—The work of equipping for electrical operation the Pennsylvania Railroad Company's Mt. Holly & Burlington branch, now operated by steam, will begin at once. Part of the materials have been placed along the route, and the balance of poles, wires, etc., is on the way. The work of construction will be pushed as rapidly as possible, and it is thought that the road will be in operation within three months. Most of the construction work will be done by the company under the direction of Superintendent Wilson Brown, of the Amboy Division. The power house, to be located at Mt. Holly, will be built as soon as the weather permits.

Buffalo, N. Y.—Hamburg Railway Company has been incorporated to build and operate a street surface railroad for a distance of one mile from Woodlawn Beach, a summer resort on the shores of Lake Erie, to the village of Blasdell, Erie County; capital, $10,000. Directors, James E. Curtis, John O'Brien, William Ellwood, Rollin L. Banta, Lafayette L. Long, W. W. Browne, H. B. Butterfield and D. W. Allen, of Buffalo, and Frank D Caldwell, of West Seneca. The road, when completed, will be nine miles long. The cost is estimated to be about $100,000. The necessary money to insure the building of the road has already been subscribed. Options were secured for the right of way two years ago.

Chicago, Ill.—Articles of incorporation of the Brandenburg Under-Car Electric Company have been filed. The company is capitalized at $5,000,000 and is organized for the purpose of constructing for the General Electric Railway Company the proposed underground electric railway extending from Monroe to Sixty-ninth street on the South Side. The ordinance granting the franchise is now in the hands of the Council committee awaiting the verdict of the owners of abutting property along the streets proposed to be occupied. The project, it is announced, is backed by a number of New York and Chicago capitalists, many of them connected with the German-American Investment Company. George Pfleger, the local manager of this company, is president of the new company.

NEWS OF THE WEEK.

Parkersburg, W. Va.—The local electric railway is to be equipped for electric operation.

Detroit, Mich.—The township board of Springwells has granted a franchise for several lines to the Detroit Railway Company.

Winthrop, Mass.—At the recent election the proposition for the grant of an electric railway franchise was defeated by a vote of 229 to 189.

Kansas City, Mo.—A newsboy who was run over by a car which cut off his leg recently obtained a verdict for $12,500 against the Metropolitan Street Railway Company.

Long Branch, N. J.—The Town Committee, headed by Levy J. Irwin, Jr., which favors the construction of the Sea Shore Electric Railway, has been elected.

Pittsburgh, Pa.—The charge of murder against Ephraim D. Cornman, a Duquesne Traction motorman, was ignored by the Grand Jury. It was his car that killed Mrs. Lydia S. Jones in front of her home.

Brooklyn, N. Y.—Police Justice James F. Quigley has been removed by the General Term, Supreme Court, for violating his official duties in showing partiality to strikers who were arraigned before him for violation of the law during the strike trouble.

Niagara Falls, N. Y.—A bill has been introduced in the New York Legislature authorizing the Aerial Tramway Company to erect a tower and landing place in the State Reservation at Niagara Falls. The company proposes to build a tramway over the Niagara River.

Chicago, Ill.—An ordinance has been passed by the town board of Cicero granting to the Lake Street "L" an extension of its line from the city limits at Fifty-second street, or Robinson avenue, along Lake street and South boulevard to Harlem avenue, the westerly limits of Cicero.

Syracuse, N. Y.—It is rumored that a project is on foot to connect Syracuse with Geneva by means of an electrical railroad. It is said C. D. Beebe and Thomas Craig, presidents of the Seneca Falls & Waterloo and the Seneca Falls & Cayuga Lake Park roads are interested in the project.

Muskegon, Mich.—The Muskegon Street Railway Company some months ago asked the Common Council to remit a tax bill of $4,500. This was refused and the company went into the hands of a receiver. The receiver refused to pay the taxes on the ground that the mortgage had first claim because the mortgage accrued before the taxes. The court now holds that the taxes must be paid.

Brooklyn, N. Y.—Levi C. Redfield, a motorman of the Bergen street line in Brooklyn, was arrested this week charged with having run a trolley car on Bergen street 200 feet in 7 seconds. The complaint was made by Inspector Franklin, recently appointed by Mayor Schieren for the sole purpose of noting the speed of the trolley cars. Redfield pleaded not guilty, and was paroled until the hearing.

Chicago, Ill.—The North Chicago Street Railroad Company has taken out a permit from the city building department to rebuild the car barns at Lincoln and Wrightwood avenues recently destroyed by fire. The plans filed are for a building 114 feet front by 260 feet deep, of irregular shape, fronting on Wrightwood avenue. The cost of construction and rebuilding is stated to be $20,000, the building to be of brick and fire-proof.

Stapleton, S. I.—The Edgewater Board of Trustees at a meeting has granted the application of the Staten Island Midland Railroad Company for the right to change the motive power upon its lines in the village from horses to electricity. A franchise was also given to the Staten Island Interior Company, of which Erastus Wiman is the promoter, for an electric road to run from the village line at Tompkinsville to Concord, with a spur to South Beach.

New Orleans, La.—The city engineer is preparing specifications for the sale of the franchise to operate a railroad, steam or electric, over the Pontchatrain Railroad, on Elysian Fields street, between North Peters street and Milneburg. The franchise expired some two or three years ago, and attention has just been called to that fact. It is understood that one feature of the specifications will require that trains be run at least every half hour, all the year round.

Niagara Falls, N. Y.—The contract for the construction of the Niagara Falls Electric Railway, which will connect Niagara Falls and Buffalo, has been let to White, Crosby & Co., of New York. The road will be double-tracked, and must be in operation by July 1 under a heavy penalty. The fare for the round trip will be 50 cents, and the time each way will be an hour and a half. Power will be furnished by the Cataract Construction Company, of Niagara Falls.

Middletown, Conn.—The work of constructing the Middletown & Cromwell Electric Road is to be begun in a few weeks, and the company, of which Israel A. Kelsey, of West Haven, is president, will expend about $50,000 in completing the line. All objections raised by the people of Middletown and Cromwell have been settled and the work is to be pushed to completion as soon as possible. It is expected now that the line will be in operation by July 1.

Chicago, Ill.—The contract for the construction of the power house for the North Chicago Electric Street Railway Company's electric lines, at Hawthorne avenue and Division street, has been awarded to Angus & Gindele, of Chicago. It will contain engines and dynamos of 3,000 H. P., the engine room to be equipped with an overhead electric traveling crane. Work on the building will be commenced at once and pushed to completion. The foundations are already in place.

Brooklyn, N. Y.—An action has been begun by Charles H. Murray against the Brooklyn Heights Railroad Company for $10,000 damages for personal injuries. The plaintiff was employed by the defendants as an electrician in the power house at Fifty-second street and Second avenue, and March 1, 1894, was making connections of wire, when he received a violent shock, which he alleges has lamed and disabled him. He also sues for an allowance of $250 for medical attendance. The defense makes a general denial.

Weymouth, Mass.—The Weymouth & Braintree Street Railway Company has decided to accept the location granted by the selectmen of Weymouth for an extension of the company's railway in Weymouth. It was also voted to petition the Railroad Commissioners for leave to increase its capital stock to $160,000 for the purpose of building and equipping the extension and building a suitable power station. It is the intention of the company to operate the line between Shaw's Corner, Weymouth and Braintree Station by April 1.

Philadelphia, Pa.—Francis Byrnes and John Maguire, the motorman and conductor of the car of the Electric Traction Company which ran over Samuel Funk in July, have been acquitted of a charge of assault and battery with intent to kill the boy, growing out of the accident. Without permitting either of the defendants to testify in his own behalf, Judge Gordon, addressing the jury, said that the Commonwealth had not made out a case showing any malicious intent on the part of the prisoners and a verdict of not guilty must be brought in.

Ottawa, Ill.—The Ottawa Electric Street Railway Company has been notified by Mayor Schoch that unless it operates all of its track in Ottawa before April 1, the franchise granted to it in 1889 will be forfeited and it will be prevented from doing business in Ottawa. The company, claiming to have lost money during the panic, offered to sell the plant which it alleged had cost $115,000, for $40,000; but three weeks ago, when the deal was about to be completed, it annulled the agreement and refused to sell. Sunday morning it practically ceased to operate the south side line as it had some time ago failed to run the Norris street and Chestnut street lines.

Fall River, Mass.—The Fall River & Stone Bridge Electric Railway Company, a branch of the Rochester syndicate, which owns the Globe Street Railway Company of Fall River, the Union Street Railway of New Bedford, the Dartmouth & Westport road between Fall River and New Bedford and the Somerset & Dighton road, proposed to be run between Fall River and Taunton, has struck a stumbling block. It had been granted locations in Tiverton by the town council, but the conditions exacted have been refused by the company. The town wanted 3 per cent. of the gross earnings, or 2½ per cent of the same, and the building, care and perpetual maintenance of 25 electric lights.

Baltimore, Md.—In Baltimore free transfers are now issued at some 40 different points; in some cases it is possible to ride 20 miles for a single fare. As a rule, in any city, transfers are confined to different lines of one company; but at a crossing of the Lake Roland Elevated and Central roads free transfers are given from one to the other. A station is located at the junction, and an agent provides the transferring passengers with a ticket. At the end of each quarter officials of the two companies meet, exchange coupons, and divide equally the residue of fares collected by one company over the other. This arrangement has resulted in greatly increasing the traffic of both roads.

Philadelphia, Pa.—Electric trolley road competition has already compelled the Philadelphia & Reading R. R. Co., to make a concession in the price of its monthly tickets between Philadelphia and Wayne Junction. The operation of trolley lines in Germantown and Chestnut Hill has also reduced the receipts of the Pennsylvania lines, so much that a number of the trains have been withdrawn. The trolley lines to Media, Darby, Chester and other points on the Philadelphia, Wilmington & Baltimore Division are also making their influence felt, and the officers of the Pennsylvania R. R. are now proposing to meet this competition, either by reducing fares or by reducing the train service.

Kansas City, Mo.—The United States Supreme Court has handed down a decision in favor of the complainant in the suit of Pullman's Pallace Car Company against the Metropolitan Street Railway Company of Kansas City. In 1887 the Pullman company built for the defendant 25 street cars for operation in Kansas City at $2,000 each. Part of the cars were inspected in Chicago and the rest were ordered sent to Kansas City when finished. This was done, but on their arrival the street car company refused to accept them, declaring that the brakes were not made in conformity with the contract. Suit was brought by the Pullman company in Kansas City for the purchase price, which is now allowed, with interest, by the United States Supreme Court.

New York, N. Y.—At a meeting of the Rapid Transit Commission this week protests were heard against the construction of a viaduct on the Boulevard, from Ninety-second street to 112th street. The viaduct was to effect a saving by which means alone the commissioners believe that the cost of the whole system could be brought down to $47,500,000, and thus kept within the limits of the $50,000,000 authorized by the Legislature. The opposition came from property owners along the line of the proposed viaduct who were unanimous in declaring that the abandonment of the whole scheme of rapid transit was preferable to what they regarded as the practical ruination of one of the most valuable residence districts in the city,

Pittsburgh, Pa.—According to James M. Bailey, the projector of the new electric road to Carnegie, work on the line will be begun as soon as the weather permits. The plans of the road, including the tunnel through Mount Washington, have been prepared, and are in the hands of contractors, who are expected to give bids within a week, after which the contract will be let. The tunnel under Mount Washington will be 2,600 feet in length. The road will take in Knoxville, Beltzhoover, Mount Washington and other points now inaccessible to street car lines, while branches will extend to Mount Lebanon and Carnegie. Entering the city by the Smithfield street bridge, the road will probably terminate near Grant street, although this part of the route has not been settled. Mr. Bailey says that the cost of the new road will be about a million dollars.

Geneva, Pa.—The Geneva & Waterloo Electric Railroad Company and the Central Hudson Company at East Geneva have been at swords point. The Central has prevented the laying of rails across its tracks in North street up the present time. The Electric road company has an order from the Supreme Court granting it permission to cross the Central's tracks at the point in question. On Monday afternoon Contractor John F. Dolan appealed to the sheriff of Seneca County for protection. The sheriff came to Geneva and was in consultation with the officers of the Thirty-fourth Separate Company considering the advisability of calling out the troops if necessary. Tuesday the Central Hudson company secured a temporary injunction against the Street Railway Company, which will prevent the crossing from being made inside of 30 days. The sympathy of the entire community is with the Street Railway Company, as it is thought that Geneva will derive considerable benefit if the road is completed to Waterloo and Seneca Falls as contemplated.

Doylestown, Pa.—It has been announced by William Jenks Fell, of Philadelphia, secretary of the Bucks County Railway Company, that as soon as the weather permitted work would be commenced on the company's proposed trolley from Doylestown to Newtown. This will be the first electric railway built in Bucks county. The Bucks County Railway Company has secured charters for lines covering almost every main road and turnpike radiating from Doylestown, the objective points being Perkasie, Quakertown, Chalfont, Willow Grove, New Hope, Newtown, Langhorne and Bristol. The Borough Council of Doylestown has already granted the company valuable franchises in the use of streets, and the right of way over public roads and turnpikes has been secured for the entire distance of 14 miles between this place and Newtown. There is nothing now in the way of beginning actual construction of this line. The company will begin laying tracks from the Doylestown end of the line probably in April, and will not ask for outside financial aid in building this road. They expect to complete it and have cars running within the present year. After finishing the Doylestown-Newtown Railway Mr. Jenks said that the company would proceed with the Doylestown-Willow Grove line if the persons desirous of having the road would subscribe for $50,000 worth of bonds and secure the company the right of way over the turnpike.

Halifax, N. S.—It is considered certain that the electric tramway charter for Halifax and other Nova Scotia towns will be granted to the syndicate headed by Henry M. Whitney, of Boston. This company is composed of Henry M. Whitney, of Boston; G. B. M. Harvey, of New York; Allen Haley, of Windsor: Thomas Fyshe, Adam Burns, Michael Dwyer, J. Y. Payzant and W. B. Ross, of Halifax; James Ross, of Montreal, and David McKeen, of Sydney. It is seeking a charter to operate an electric tramway over the streets that the horse car lines run on. The mortgage bonds of the old company cover only the roadbed, cars, horses, etc., and a fire recently destroyed most of the cars and stables. The charter of the new company provides that the old company may sell its roadbed to the Whitney Company on payment of $25,000. The Nova Scotia Power Company, which controls the stock, is willing to sell to Whitney, but that would leave the bondholders with only a few antiquated cars, etc., as security for their $250,000. The bondholders, therefore, oppose the granting of a new charter to Whitney, as a breach of faith with them on the part of the Legislature, and profess their willingness to equip the road with electricity themselves, or they will be satisfied if the new company will guarantee to take their bonds at 25 per cent. of their face value. The promoters of the new company reply that, if the bondholders were so foolish as to invest $250,000 on a $100,000 security, and then allow their property to degenerate into a public nuisance, they have only themselves to blame.

PERSONALS.

Mr. Charles E. Newton, of the Jewell Belting Company, Hartford, Conn., was in New York this week.

Mr. W. L. Brockway, superintendent of the North Woburn (Mass.) Street Railway Company, died last week.

Mr. E. J. Hart, president of the Canal & Claiborne Railroad Company, New Orleans, died on March 8, at the age of 79 years.

Mr. Geo. F. Sandt has resigned his position as secretary and treasurer of the Electrical & Mechanical Engineering Company. He will remain in the electrical field. His address for the present is Westfield, N. J.

Mr. W. Frank Carr, formerly general manager of the Roanoke Electric Light and Power Company, Roanoke, Va., has been appointed superintendent of electrical contruction for the West Chicago Street Railway Company, vice Mr. J. S. Hill, resigned.

TRADE NOTES.

The Peckham Motor, Truck & Wheel Company has recently taken more commodious offices in the Exchange Building, 53 State street, Boston.

J. H. Stedman, of Rochester, N. Y., has just issued an exceedingly handsome pamphlet, descriptive and illustrative of his comprehensive system of transfer tickets.

The F. E. Belden Mica Mining Company, of Boston, Mass., miners and dealers in mica and manufacturers of ground mica, quartz flint and silex, have established a branch office at 182 Franklin street, New York, where all their products may be found. Union Adams, Jr., is the New York representative of the company.

Nassau Railway Company's Power Station.—The new power plant for the Nassau Electric Company, at South Brooklyn, N. Y., is fully completed. This building was designed and built by the Berlin Iron Bridge Company, of East Berlin, Conn. The engine and dynamo room is 58 ft. wide and 150 ft. long, equipped with a 13 ton crane having a travel the full length of the building. This portion of the plant is covered with the Berlin Iron Bridge Company's patent anti-condensation corrugated iron roof lining. The boiler room is 47 ft. in width and of the same length as the engine and dynamo room, and is so arranged that 2,000 tons of coal can be stored in the pockets. The entire construction is of iron, and the buildings, when completed, will be fire-proof.

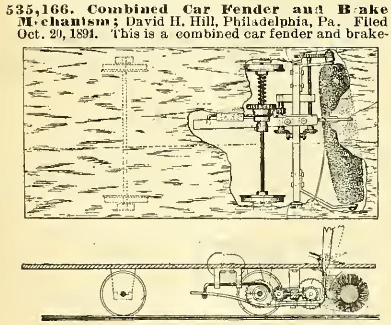
RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued March 5, 1895.

535,078. Street-Car Pilot; John J. Rhine, Pittsburg, Pa., Assignor of two-thirds to Frederick W. McKee and Samuel Kelly, same place. Filed November 6, 1894. The guard has a shaft in the rear journaled in the car. A bail is connected to the guard in front of the shaft, and a releasable hooked arm engages the bail and is connected to an operating lever.

535,165. Fender for Street-Cars; Bicknell Hall, Taunton, Mass., Assignor of one-half to Edward P. Coleman, same place. Filed September 25, 1894. The fender is hung below the platform of the car, and a connecting rod connects the fender with the car truck, and is adapted to change the position of said fender as the car oscillates. The connecting rod being adjustable in length, the location of the fender with relation to the road bed may be adjusted.

535,166. Combined Car Fender and Brake Mechanism; David H. Hill, Philadelphia, Pa. Filed Oct. 20, 1894. This is a combined car fender and brake-operating mechanism. Arms are pivoted to the car, and levers pivoted to the arms, means being provided for interlocking the arms and levers.



No. 535,302.

535,168. Street-Car Seat; John Krehbiel, Cleveland, O. Filed March 26, 1894. Blocks extend above the seats and form divisions between the sittings, means being available for vertically adjusting the blocks and for converting them into auxiliary seats.

535,184. Safety-Fender; Myron J. Amick and Johannes Roos, New York, N. Y. Filed Feb. 16, 1894. This is the combination of an oscillating flap with a shaft carrying a pawl, a shaft carrying drums and sprocket wheels, a pawl, straps, rollers, and a scoop.

535,200. Car-Starter; Thomas J. Gray, Chicago, Ill., Assigned to William J. Edwards, same place. Filed Jan. 27, 1894. This comprises a gear connected with the axle by a power storing spring, a clutch being interposed between the axle and gear. Pinions are carried by the clutch and engage the gear, and an abutment gear is engaged by the pinions.

535,211. Brake for Railway Cars; Nelson Lampman, Woodstock, Canada. Fled Dec. 17, 1894. A spring-actuated mechanism tends normally to apply to the brakes and a detent for holding such mechanism in position with the brakes off. There is a trip for the detent, and a cord connected with the trip, the trip normally occupying a mid position and being free to move in either direction, that is, forward or backward, from such mid position according as the rope is pulled in one direction or the other, and being constructed to operate the detent whichever way it be moved.

535,214. Contact Device for Conduit Electric Railways; Frank E. Lodetti, Rondout, N. Y. Filed May 4, 1894. A series of insulated and water-proof switch-boxes is electrically connected to the insulating electric cable. The propelled car or cars have a traveling contact of the same length as the car or cars attached to the trucks or to the axles in the point corresponding to the middle of the axles, and constructed so as to bend easily around the curves of the road and to push down the outside arm of switch-boxes when the the car or cars are standing or running on them. The thin flat conductor connects the skate or collector of the running section or traveling contact to the motors on the car or cars. It is located in the guide of the running section and consists principally of a metallic thin plate of high electric conductivity, thoroughly insulated, and protected by a metallic cover bolted to the guide.

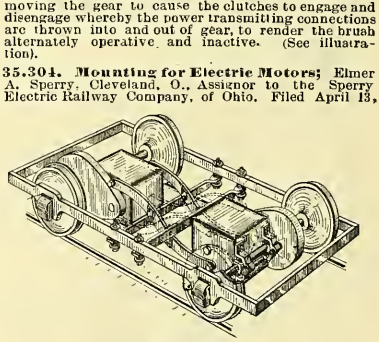
535,221. Automatic Protecting Fender for City Railway Cars; William H. Page, Burlington, N. J. Filed August 20, 1894. The car truck is provided with diagonally disposed rotating brushes closely converging at the front ends thereof forward of the wheels. Mechanism is connected with the rear ends for rotating the brushes, and links and a frame form a suspending mechanism for holding the brushes normally above the roadway. The suspending links are provided with a guard arranged to lower the brushes upon an approaching obstruction, and a push pin is arranged to depress the brushes at the will of the driver.

535,294. Closed Conduit for Electric Railways; Patrick Murphy, Chicago, Ill. Filed January 9, 1894. A normally closed conduit incloses trolley and it comprises a pair of hinged members overlapping at their ends. Traveling wheels are carried upon the car adapted to engage the hinged members at points located upon the opposite side of the pivotal axes from the overlapping ends to open the conduit for the passage of the trolley support.

535,297. Sectional-Conductor System for Electric Railways. Alfred Rosenholz, San Francisco, Cal., assignor of one-half to Samuel J. Clarke and Harvey S. Brown, same place. Filed Oct. 11, 1894. The main conductor is inclosed and insulated in tubes made in lengths and an inclosing conducting band soldered thereto. An iron core is connected with and insulated from the band, and an insulated coil surrounds the core, having one end connected with the conductor and the other with a contact plate, inclosing non-conducting casing with slotted sides, and hollow necks project from the sides, and insulating collars fit the recesses in the necks. Channels are made in the collars and the necks. Flexible locking strips fit the channels. There is a closing cap at the opposite end of the casing, and a filling of non-conducting cement between the cap and the main conductor.

535,302. Track-Cleaner; Andrew J. Smith, Stockton, Cal. Filed November 23, 1894. The track-cleaner consists of a brush carried under the car. Power transmitting connections are carried by the rocking frame whereby said brush is operated from the axle. The gear is mounted loosely on the axle and forms part of the power transmitting connections. The mechanism is actuated by the movement of the frame or head for moving the gear to cause the clutches to engage and disengage whereby the power transmitting connections are thrown into and out of gear, to render the brush alternately operative and inactive. (See illustration).

535,304. Mounting for Electric Motors; Elmer A. Sperry, Cleveland, O., Assignor to the Sperry Electric Railway Company, of Ohio. Filed April 13, 1894. In a power transmission for vehicles, a bi-axled running gear, a motor is mounted upon each axle through an elastic connection and extends therefrom in such a manner that its center of gravity shall pass through a vertical line at one side of the axle. An arm extends from one motor to the other attached to the motors at points on the opposite sides respectively of of their centers of gravity. (See illustration.)



No. 535,804.

535,324. Electric-Railway Conduit; William T. Dulany, Jr., New York, Assignor of one-half to Oscar F. Shaw, Brooklyn, N. Y. Filed Dec. 14, 1894. The conduit has a drainage cess-pool connected with it. The cess-pool discharge pipe has a float-check valve therein as an electrically operated pump has its suction pipe within the drainage cess-pool. The pump is automatically started and stopped by variations in the level of the water in the drainage cess-pool above the float check valve.

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As the STREET RAILWAY GAZETTE is published 52 times a year, and is the only weekly publication devoted to Street Railway Interests, its value as an advertising medium will be apparent to Manufacturers and Dealers in Street Railway Apparatus and Supplies of every description. We will take pleasure in quoting rates for advertising space.

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Novel Form of Rail Bond. A new type of rail bond, which we illustrate and describe elsewhere in this issue, is so radically different in all respects from forms heretofore designed that it is worthy of special notice and investigation. Should the claims made for it be substantiated, bad joints, with all their attendant evils, should soon become things of the past. The new feature of the bond consists in the application of a plastic metal compound, which makes an absolute contact between the rail and the fish plate. The affinity between the two metallic surfaces is so complete, it is claimed, that the effect, so far as conductivity is concerned, is practically the same as if continuous rails were used. Tests of the bonds in actual service are to be made and the results will be noted with interest.

Duty of the Motorman. We present elsewhere in this issue a brief article relating to a significant decision of the New York Court of Appeals in an accident case. In this case, it was shown that a child ran out upon the street railway track a few feet in front of the car, so near, indeed, that the motorman was unable to stop quickly enough to prevent an accident. The Court of Appeals says that, inasmuch as the motorman did all in his power to prevent the accident and that as he cannot be expected to do what is impossible, damages for the accident cannot be recovered. This decision seems to be based upon good common sense, though it seems to vary somewhat from the findings of many lower courts, whose opinions would seem to indicate a belief that the motorman should exercise an impossible vigilance.

Compressed Air Motors. The results that have attended the attempts to use compressed air for street railway traction have not been of a kind to encourage faith in enterprises of this kind. There are, however, a considerable number of persons who believe that the problem is by no means insoluble, and that success is attainable. We believe that only one compressed air car is now in service in this country at the present time. This is operated by the Mekarski system, which is utilized practically in two or three places in Europe. In this issue we publish a description and illustration of a new compressed air car, for which many interesting claims are made. Certainly, it has attracted the attention of men whose good opinion is worth something, and if the claims can be made good there will certainly be a place for the car in the street railway field.

The Heilmann Electric Locomotive. The discussion of the paper of H. Ward Leonard on electric engineering developments in England and France by members of the American Institute of Electrical Engineers was of unusual interest, especially that part of it relating to the Heilmann electric locomotive. The several speakers were not inclined to regard with approval this combination, which is a complete traveling electric power station designed to generate the current needed for the operation of a train; in fact, before the presentation of Mr. Leonard's paper, few of them esteemed it worthy of serious consideration. One interesting point brought against the electric locomotive was that advanced by Mr. Forney, who showed that if the Heilmann plant was to cost $50,000, which is about five times that of the ordinary passenger steam locomotive of the largest size, the excess of interest charges would more than offset the saving produced by economy in operation. Several interesting points were brought out in the discussion, both for and against the Heilmann locomotive, and the general opinion regarding it was expressed by the President. He had been surprised to learn that the locomotive, which practically carries a central power station with it, could show such favorable figures in respect to economy, and he was rather disposed to assume that a great deal of the supposed advantages possessed by it would be found to consist in improvements on existing mechanical locomotive practice.

Opposition to Connecticut Electric Roads. The most bitter war against electric street railway companies is now being waged in Connecticut by the steam railroad companies. It is a well-known fact that electric railways have been multiplying along the line of the steam roads in the Nutmeg State at a most extraordinary rate during the last two years. When the construction of these roads was begun the railroad companies made no opposition to them. Railroad men sneered at the idea of their becoming competitors and ridiculed the possibility of their working any injury to the well-established steam railroad business. Within the last year, however, a very decided change of front has been noticeable in steam railroad circles, for it had become apparent that the electric railways were not only paralleling the steam roads, but were forming roads of considerable length by becoming linked together. The steam railroad companies have now become thoroughly aroused to the situation. It has been generally supposed that the trolley lines were commencing to cut into the business of the steam roads and serious competition has been predicted, but the formidable character of the competition at the present time was not properly appreciated until a few days ago, when, at a hearing of the Railroad Committee of the Connecticut Legislature, the Vice President of the New York, New Haven & Hartford Railroad Company, presented a collection of statistics, showing the decrease in the way traffic in Connecticut. The passenger business has suffered in the most amazing fashion. Receipts have been cut down apparently all through the State, wherever parallel electric railways have been constructed. The percentage of decrease in passenger traffic between different towns that are connected by trolley roads, ranges all the way from 30 per cent. to 90 per cent.; for example, the traffic between New Haven and West Haven has been reduced 70 per cent.; between Meriden and Yalesville it has decreased 90 per cent; between Derby, Ansonia and Birmingham the percentage of decrease is the same; between South Norwalk and Winnipank the reduction has been 90 per cent., while the traffic between Danbury and Bethel is 75 per cent. less than formerly. Figures like these are of marked significance. They indicate that the electric railway possesses a potent attraction for the public. It could not have been so successful had it not afforded reliable, rapid and comparatively cheap transportation. Under these circumstances, it is not surprising that the oposition to the further construction of parallel electric lines is so active and vigorous; but it is safe to assert that the progress of the trolley line, now that the people thoroughly appreciate its merits, cannot be effectually checked for any considerable time.

INVESTIGATING THE BROOKLYN STRIKE.

The legislative committee which was appointed to investigate the Brooklyn street railway strike has finished its work in Brooklyn. On March 16 John D. Crimmins, the street railway contractor who built the Broadway cable road, was called as a witness.

He had had, he testified, much experience in employing large numbers of workmen. He told the committee that in his opinion a compulsory arbitration law would be a good thing, if it could be made binding on the employees. There was no doubt about its being binding so far as the companies were concerned. He had acted as arbitrator between employers and trades unions on many occasions and he had found that the men were usually bound by certain rules and by-laws of their organizations, and he could see no reason why a law which bound a trade union to abide by the decision of a compulsory arbitration commission should not be operative against the men. He did not believe that railroads, under municipal management, could ever be brought to the efficiency of the police or fire departments. He would favor the licensing of motormen as an experiment, if nothing more. It could certainly do no harm and might result in some good.

Mayor Schieren being recalled retold the story of the proposition to arbitrate between the men and the companies. He said that the refusal of President Norton of the Atlantic Avenue Railroad Company to consider the matter stopped further proceedings. He thought railroads were better managed by private corporations than by municipalities.

D. F. Lewis, President of the Brooklyn Heights Railroad Company, was recalled.

He testified that in his opinion the municipal ownership of street railroads would not be successful; that the city government as a corporation was not sufficiently perfect to go into the railroading business. He could not favor a compulsory arbitration law, as such a provision would depend altogether into whose hands such authority would be placed. He favored the idea of licensing motormen, and thought that the Brooklyn Heights company would readily agree with such an agreement. He denied that he had ever made the statement that the strike had cost his company $500,000.

Carroll D. Wright, United States Commissioner of Labor, was called to the stand and was asked his opinion of compulsory arbitration. He said that the labor organizations throughout the country were very generally opposed to it, and that any recommendation by the committee to that end would be a leap in the dark and purely experimental. In his opinion, compulsory arbitration carried out would increase the differences between employers and employed. It would increase the feeling of suspicion which is largely responsible for the differences now existing. Its effect would be be the same as that of a lawsuit between neighbors —a life long feud. Compulsory arbitration would establish the rate of wages, which would mean the establishment of the price of commodities, an effectual economic bar to its success. Mr. Wright spoke favorably of voluntary arbitration, the value of which had been demonstrated in New York, New Jersey and Massachusetts, where it had been tried. The value of any arbitration he declared was in the giving of the truth to the public. To make compulsory arbitration possible, were there no other difficulties involved, both sides must give bonds to abide by the decision of the arbitrators. The witness said that managers of corporations were seeing the necessity of confidential relations with their employees, and where they did so the troubles of both sides were very much decreased.

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Warren, Mass.—A new company will at once apply for a charter for an electric road extending from Spencer, through East Brookfield and Brookfield to the town hall at Warren, Mass. There will also be a branch from West Brookfield to North Brookfield. The capital stock of the company is $150,000.

DEATH OF E. J. HART, OF NEW ORLEANS.

A brief announcement of the death of Mr. E. J. Hart, president of the Canal and Clairborne Street Railroad Company, of New Orleans, was made in the last issue of the STREET RAILWAY GAZETTE. Mr. Hart was one of the best known and wealthiest citizens in New Orleans. He was born in Easton, Pa., Feb. 10, 1817, and began life as a clerk in Philadelphia when but 15 years old. He soon went to New York, where he filled the position of bookkeeper for a short time in a wholesale dry goods house. In Oct. 1837, when 20 years of age, he decided to go South, and accepted the position of bookkeeper under his uncle in the dry goods firm of Hart, Labatt & Co. Inside of a year the firm went out of business. Mr. Hart wound up the business of the firm, and went to Houston, Tex , where, in 1838, he embarked in the wholesale grocery and general merchandise business on his own account. The venture was a most successful one, and Mr. Hart continued it for nearly 30 years. in the meantime investing extensively in Texas lands and removing to New Orleans.

Shortly after going into business in Texas, Mr. Hart established the wholesale grocery house of E. J. Hart & Co. in New Orleans.

E. J. Hart.

In 1846 the Morgan steamers plying between New Orleans and the Texas seaboard were charging $1.25 per barrel of flour from New Orleans to Galveston, with proportionately higher rates to other Texan ports, and the rate was driving New Orleans trade away. Mr. Hart's firm, which had previously sent out occasional chartered vessels, determined to break the Morgan monopoly, and began the operation of a rival line. The result was that in six years Mr. Hart had forced the Morgan line to come to him to sue for peace. Messrs. Morgan & Harris agreed that the rate should never be more than 50 cents a barrel from New Orleans to Texas, and the New Orleans interests being thus secured the Hart steamers were withdrawn from the trade. During these six years Mr. Hart's firm did not once ask for outside aid in fighting the Morgan interests.

This did not, however, end the connection of E. J. Hart & Co. in the steamship trade between New Orleans and Texan ports. After losing two steamers in the Brazos trade, Mr. Morgan and his associates asked Mr. Hart's firm to take a quarter interest in the new vessel to be built. After much persuasion Mr. Hart consented, and the *Nautilus* was built. She was lost in the storm that submerged Last Island in 1856. Mr. Hart was then persuaded to accept the presidency of the then organized Southern Steamship Company, which bought out the Texas trade and thus clashed with the powerful Cornelius Vanderbilt.

Mr. Vanderbilt told Mr. Hart that he was determined to drive the Morgans from the Texas trade. After exhausting all his arguments for the interests of the shippers in New Orleans, Mr. Hart took up the gage thus thrown down, telling Mr. Vanderbilt he would sink his stock over a year, but he would remain in the fight until he won it for New Orleans' interests. In two years following Mr. Hart's company, the Southern, lost two steamers by fire, but at the end of that time Mr. Vanderbilt gave up the fight and the Southern had $50,000 profits to show.

He was identified with many movements, large and small, and at different times with many firms besides the one that bore his own name. He was a very extensive land-owner both in this State and in Texas. He was a director in the Sun Mutual and the Canal Bank, often acting as President of the latter; President of the Canal and Claiborne Railroad and the National Automatic Fire Alarm Company, operating the American District service. He was the largest stockholder in that very strong concern, the Galveston City Company, and the third largest owner of shares in the Galveston Wharf Company.

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LONG AND SHORT CARS.

A president of one of the leading roads in St. Louis recently remarked that the car of the future would not be very much different from the average long car in use at present. The trailer is fast disappearing, having all against it and nothing in its favor, says the St. Louis *Globe-Democrat*, while but few objections can be placed against the former. The long car that is now being turned out is of ample proportions, that contrasts greatly with the dinkies and trailers that it passes on the streets. It is very popular with the public, is more easily handled, carries more passengers, is more economical to operate. and, lastly, costs but very little more than the ordinary single-truck car. It is less liable to meet with accidents, and, so far, it has not maimed one person where the short car and trailer has injured 10. There are some points yet to be settled, that being chiefly as to trucks. The Robinson radial and the bicycle trucks claim most attention, and each has its friends. "However, it can be said," continued the loquacious president, "that both have good tractive power; that is, the car moves along without the wheels slipping when the car is going up grade or at starting with a load. I have no doubt that in a short time there will be uniformity as to length and height, the breadth being pretty well settled now. The largest cars in commission in this city are 42 feet long over all, but the majority of them are 34 feet, while some are 30 and still others 28 feet over all. The platforms range from 3 to 4½ feet each. Cars of smaller dimensions than the last given cannot be classed as a long car."

What is the average cost per day to run and maintain, including depreciation and interest on the bonds, and what are the average daily receipts of a long car? These are perplexing problems, for it is no easy task for the officials of any company to figure that out to a nicety, for the reason that all the roads have a mixture of cars, with different car mileage every 24 hours. Some of the companies were not prepared with ready figures. The railway expert of the *Globe-Democrat*, of St. Louis, obtained figures from three companies from which a mean average was obtained, and is herewith given:

The approximate receipts per car per day for a large double-truck car, making 110 miles per day	$21.00
Cost of operating the same cars per day as follows:	
For conducting transportation	$7.15
For repairs of track, poles and wires	1.20
For repairs to motors and cars	2.75
For power	2.75
For general expenses, salaries, taxes, etc	3.30
Interest on bonds	2.20
Totals	$19.35
Net profit on 12 hours' run	1.65

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Springfield, Mass.—The directors of the street railway company have accepted the Elm street location in West Springfield for the Holyoke extension of its electric system. A joint committee of three men from the Springfield company and three men from the Holyoke company will have charge of the equipment and running of the cars. Work will begin at once on the new line and it is expected to be in running order in May. The Springfield company will build to the Holyoke boundary line, and the Holyoke company from there into its own city. Thirty cars will be required on the line, and of these the local company will furnish 18, for which a contract has already been placed with the Wason company.

HARDIE COMPRESSED AIR MOTOR CAR.

The Hardie compressed air motor, which has been in course of construction in Rome, N. Y., during the last few months, was publicly tested a few days ago. The trial was made on the tracks of the Rome Locomotive and Machine Works, where the motor was built. Among those present at the test were Geo. S. Forbush, of Boston, President of the Union Traction Company of New Jersey; W. F. Ellis, of New York, President of the American Company, constructing engineers; E. W. Pettee, chief engineer of the Union Traction Company; W. H. Delany, of the Fulton Street Railway; President Wardwell, A. C. Kessinger, Wm. P. Rayland and A. W. Orton, of the Rome City Street Railway, and many others.

The car, which was built in accordance with the plans of the inventor, has an 18½-foot body and is vestibuled at each end. The mounting of the motor and car is such that the pounding on the rails is lessened in a remarkable degree. It is claimed by the inventor that so little is the effect on the rails by the passage of the car that heavy track construction will be unnecessary; a rail heavy enough to withstand the ordinary street traffic will be sufficient for the track. The inventor is not yet ready to disclose the new features of his compressed-air engine, but he makes strong claims for it, and asserts that the difficulties heretofore encountered have been overcome. The cylinders will hold, it is stated, sufficient compressed air for a run of 15 miles, and as high speed as may be desired on any street railway may be attained. Several companies, it is stated, have expressed their readiness to make trials of the cars, and agree, in case it shows the advantages claimed by the inventor, to equip roads for operation by compressed air.

The trial of the car was made on the 800 feet of rough track in the yard of the locomotive works. The car started out with 1,800 pounds of air pressure to the square inch and a high temperature in its hot water tank, which is used for heating the air before it passes at reduced pressure to the engine cylinders. A valve constructed for the purpose reduces the pressure of the stored air to 140 or 150 pounds, which is the working pressure. The motor starts gently, runs smoothly at a rapid rate and stops by air brake without jerk or jar. It was run back and forth repeatedly for upward of 40 trips and the test showed that, under the conditions applied, the motor would run 12 miles from one charging of compressed air and make 70 stops. In the afternoon a trial was made without warming the compressed air. This test showed that the warmed air will exert nearly double the force yielded by the cold air, and consequently carry the motor nearly double the distance.

The method of recharging the storage cylinders with compressed air was shown. It is a very simple operation and, with the flexible couplings used for the purpose, the recharging of a car with power need not occupy more than a minute or two. The same is true as to recharging with hot water, and the two can be done at the same time.

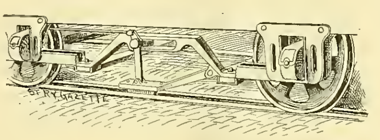
HARDIE COMPRESSED AIR CAR.

Another test was recently made of the compressed air motor on the main line of the New York Central railroad. A run of 12 miles was made. Among those who took the trip, Assistant Superintendent Leonard and Trainmaster Fripp of the New York Central, Captain Feideger, Assistant Engineer of the Commissioners of the District of Columbia, General Hermann Haupt, and others. It was stated that the trial was in all respects successful, and the maximum speed was 24 miles per hour.

The car and motor are owned by the General Compressed Air Company of New York City.

PROUTY TRACK BRAKE.

The track brake shown in the accompanying illustration was designed by E. Prouty, of Chicago, for use on the cable trains while passing through the tunnels under the Chicago River. The fatal accident in the Washington street tunnel in that city a few weeks ago seemed to prove that some appliance more effective than the ordinary wheel brakes with which the cars are equipped were urgently needed on the steep grades of the tunnel approaches. A test of the Prouty brake was made last week under the supervision of a special committee of the common council. Representatives of the North and West Chicago Street Railroad Companies, Mayor Hopkins, and the Commissioner of Public Works were also present. Two grip cars were equipped with Prouty brakes; one was sent through the La Salle street tunnel and the other through the Washington street tunnel.



Prouty Track Brake.

The brake is designed for use only in the tunnels where a special grooved rail is used. The principle on which the device is constructed is shown by the cut. It differs from the ordinary type of track brake in that it has a shoe with a bead edge, made to fit the groove in the rail. The inventor states that the brake is capable of holding three times as great a load as will ever be necessary. If the train is running rapidly when the brake is applied the friction causes the shoe to heat and expand in the groove, thus increasing its holding power.

During the tests, it was shown that the new appliance would stop the train of three cars almost instantly, without the aid of other brakes. Then the second and more severe test was made. The train was started down the grade at the full speed of the cable. Then the grip was released and the train allowed to coast until it gained nearly twice its usual momentum The new brake was applied and the train stopped within 30 yards. The checking of the speed was, it is stated, gradual and without the jerk or rebound characteristic of the wheel brakes. As the track brake is operated by its own lever, the wheel brake may be used also.

The brakes will be kept in use several weeks in order that they may be thoroughly tested. If they prove satisfactory the Council committee will recommend their general use on all trains passing through the tunnels. The officials of the street car companies have agreed to adopt any style of brake which proves superior to those now in use.

RECEIVERSHIP FOR THE LONG ISLAND TRACTION COMPANY.

A receiver for the Long Island Traction Company, the leesee of the Brooklyn Heights Railroad Company, of Brooklyn, N. Y., has just been appointed by the United States Court for the District of West Virginia. The appointee of the Court is Horace J. Morse, of A. M. Kidder & Co., of New York. The application was made by the counsel of the company and was indorsed by a committee of the stockholders recently appointed to extricate the company from its financial difficulties. The ground on which the receivership was asked for, was the company's inability to meet interest on collateral trust notes and rental charges.

The Long Island Traction Company was organized two years and a half ago for the purpose of acquiring control of the Brooklyn City Railroad. This was effected through the lease of the latter to the Brooklyn Heights Railroad Company, the entire capital stock of which ($200,000) was acquired by the capitalists who organized the Traction Company. The capital stock of the Traction Company was $30,000,000, and a charter was taken out in West Virginia, because the laws of that State permitted them to sell the stock for less than par.

Of the total issue, $27,000,000 was offered to the stockholders of the Brooklyn City Railroad at 15, the syndicate that engineered the deal receiving the remaining $3,000,000, it is said, for its services. Of the money raised from the sale of the $27,000,000 of traction stock, $4,000,000 was put up as a a trust fund as security for the payment of the 10 per cent. dividends guaranteed upon the $12,000,000 of Brooklyn City Railroad stock. If the Brooklyn City stockholders had taken all the traction stock at 15, this would simply mean that they furnished their own guarantee.

Flattering promises were made when the traction company sought the control of the Brooklyn City Railroad, with its system of 199 miles. The road would be changed to electricity, and a very great saving in expenses would result, so that the profits would be very much larger than heretofore.

These improvements embarrassed the traction company, so that a considerable floating debt was incurred. Three million dollars of collateral trust notes were authorized; only a part of which it was able to dispose of. Furthermore, the traction company found it necessary to draw upon the guarantee fund to the extent of $250,000, which had been set aside for the security of the Brooklyn City Railroad stockholders.

Since the collateral trust notes were put out there have been two factions. Efforts were made to enjoin the issue, but without success. The only security for these notes, which were payable three years from Sept. 1, 1894, were the $200,000 of Brooklyn, Queens County and Suburban Railroad stock, the "interest" of the traction company in the Brooklyn City Railroad lease and certain claims for improvements which were declared to be due from the Brooklyn City Railroad in case the lease was cancelled.

To meet the rental due April 1 to the Brooklyn City railroad, the committee of stockholders, of which Mr. Morse was chairman, decided to assess the stockholders $2 a share. There was much grumbling at this. The appointment of a receiver is considered a victory for Jenkins and a defeat for the Lewis faction.

The stockholders' committee has issued the following notice:

Certain of the collateral trust noteholders of the company, acting for themselves and others, have therefore, proceeded against the Long Island Traction Company and the Brooklyn Heights Railroad Company, in the domicile of the Traction Company in Virginia, and the United States Circuit Court has appointed Horace J. Morse receiver of the Long Island Traction Company.

Such action was taken with the knowledge and approval of your committee and stockholders of the company to a large amount, in the belief that it was necessary at the present time. This application for a receiver, however, is simply an anticipation of like action, which, in the opinion of your committee and its counsel, might ultimately have been necessary in order to accomplish the prompt and successful reorganization of the company.

Before a receivership at this time was contemplated the co operation of a large majority of the holders of the collateral trust notes (which your committee in its previous circular stated would be invited) had been secured in aid of reorganization, subject to the raising by your committee of the sum of $500,000 before March 28, 1895.

Such co-operation, in brief, is that moneys contributed by stockholders and others shall, under certain conditions, share in equal proportion with the assenting collateral trust noteholders in any reorganization of the traction company. It is now the intention of your committee to advance the money. to pay the rental and other obligations, to the receiver instead of to the company as before outlined. The receiver's certificates, if issued and purchased, will be held by your committee and disposed of for the benefit and protection of the contributors of moneys and of the assenting noteholders.

This arrangement with the assenting note-holders will, in the opinion of your committee, insure the contributing stockholders greater protection than could otherwise be possible.

The stockholders are therefore urged to contribute the amount of $2 per share heretofore requested and thus participate to the fullest extent in the benefits of any reorganization which may take place.

The participation receipts, to be issued by the committee, will be ready for delivery on Friday, Feb. 22. Meanwhile, contributors will receive the receipt of either the First National Bank, of Brooklyn, the People's Trust Company, of Brooklyn, or the New York Guarantee and Indemnity Company, of New York, to be exchanged for the committees receipts as soon as some are printed and ready for delivery.

OBJECTION TO THE TROLLEY MAIL SERVICE IN BOSTON.

Employees of the West End Street Railway Company, of Boston, last week held a mass meeting to protest against a grant to the company of the right to carry the United States mails. The objection to the trolley mail service is the result of a fear that federal troops might be called out to prevent any interference with the mail cars in case of a strike. The speakers indulged in the wildest kind of language. One of the number, for example, declared that the West End did not seek the privilege in order that the public might be accommodated, but that the employees might be successfully opposed in any attempt to improve their condition, raise wages, or reduce the hours of labor. He declared that if the Legislature should grant the West End the privilege of transporting mail then every car run during a difficulty with the employees would be a United States mail car, the striking employees would be accused of obstructing the mails and the United States troops would be called out to shoot the workingmen.

The following curious resolutions were adopted:

Whereas, certain grievances now pending between the West End corporation and its employees have been ignored and repudiated by said corporation each time they have been submitted for consideration and adjustment, and

Whereas, the men have been at all times, as they are to-day, willing to place their complaints in the hands of any non-prejudiced conciliatory body for arbitration, therefore,

Resolved, that we protest against the passage of a bill now before the Legislature securing to the street railroad corporation the right to use their lines for the alleged purpose of carrying the United States mail, and that we call upon all good citizens to aid us for the following reasons:

First, because of the extra rate of speed called for—dangerous alike to motormen and pedestrians.

Second, because we see in it an evasion of conciliatory methods of redress for existing grievances.

Third, because we recognize in it a cold blooded, premeditated pretext to secure the assistance of federal bayonets to uphold wrong where conciliatory methods are capable of rendering equal justice,

Fourth, because we feel that the request of the street railroad corporation is an injurious conspiracy against the public peace, for which alleged accommodation of the people is merely a cloak for projected massacre.

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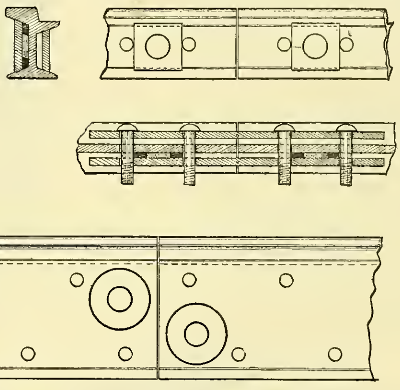
A PERFECT RAIL BOND.*

BY HAROLD P. BROWN.

In the large railway power houses that have been built during the past year or two, every resource of engineering skill has been called upon to secure economy of power. The best types of boilers, of feed-water heaters and fuel economizers are used; the engines are compound, and, when possible, condensing; the dynamos are direct driven, and a high ratio is maintained between the hourly coal consumption and the average electrical output. Yet the result in pounds of coal per car mile is far from satisfactory. The motors are not to blame, and popular series parallel control has diminished former rheostat waste in starting and slow running. The fault evidently lies in heavy transmission losses, and yet we are frequently told that the drop of pressure is only 10 per cent. Unfortunately, this is not the case; for we again and again find 400 volts at the motor while the dynamos are at 550, or 27 per cent. drop, and practical electric railway men are beginning to realize that this means a transmission loss of 47 per cent. Such losses are encountered almost every day by even the best roads, and are usually the result of bad bonding.

In an electric lighting system the drop in pressure between dynamos and incandescent lamps indicates the total loss in transmission, but in an electric railway line the drop is only a portion of the total loss. When a drop of pressure is encountered at the terminals of an incondescent lamp, its current diminishes, its resistance rises and it therefore absorbs less energy. In this case a 10 per cent. drop means a 10 per cent. total loss in conductors. A railway motor with the same drop will at once lower its speed and will therefore require a corresponding increase of current to do the same work. Hence the supreme importance of perfect bonding, for the pressure cannot be maintained if there is a heavy loss at every rail joint.



FIGS. 1, 2, 3, 4.—PLASTIC RAIL BOND.

Very few electricians have suspected that there is in all copper bonding of steel rails a loss which does not depend upon the cross section, the contact area nor the mechanical perfection of joint. Modern practice in rail bonding ordinarily calls for a generous amount of copper with a rail contact area of 7 to 10 times its cross section and with heavy bolts, nuts or wedges to hold the two metals together. When such a joint is covered with a viscous paint it would seem to be mechanically and electrically perfect. But careful measurements of the drop in these joints, even when new and at their best, give startling results with heavy currents. The thermo-electric difference between steel and copper evidently causes loss many times that due to the resistance of the copper alone. But when this joint has been submitted for even a few months to the acidulous moisture of a city street and to the mechanical changes encountered in service, the loss grows rapidly greater. Only a short time is required to deposit a slight film of iron rust between the surface of rail and bond; this film is of high resistance and serves as a channel for the admission of more and more moisture and the conductivity decreases rapidly. Every passing car and each change in current aids in the work of destruction.

For several years experiments have been in progress at the Edison laboratory, with its magnificent equipment for investigation, to obtain a permanent rail bond of low resistance, which would encounter no thermo-electric loss, would make an absolute contact and would be proof against rust and against mechanical injury from the hammering of wheels and the changes of temperature and variations of current. Hundreds of promising schemes were tried and found wanting. As has been stated elsewhere, every practical combination of metals, every method of joining, of excluding moisture, of providing for expansion and contraction, has been tested with heavy currents and then buried for the test of time. The contact surfaces have even been welded together, have been machined and scraped to an exact fit, bolted together with heavy pressure, plated with tin, or copper, provided with sheet lead, tin foil or other soft metal or with various non-rusting alloys placed under compression, covered heavily with paint or other water repelling insulation or a combination of several of these. But only a single one of these has successfully withstood the test of time and has proved to be a perfect rail bond. After a test of about four years on covered rails, it shows no increase of drop and will carry 1,500 amperes. A large number of these joints have recently been dug up for examination and show no trace of rust on the contact surfaces.

In its present form the "Plastic" rail bond, as it is called, is composed of two portions; a plastic metal compound which makes an absolute contact between the rail and the fish plate, and a case to hold it in position between the bolt holes as near the end of the rail as possible. No holes in the rails are needed, nor any wires, plates, bolts, nuts nor rods, and the completed joint is perfectly protected by the fish plate. For different types of rails cases of various shapes are used. For heavy girder rails the case is a flat ring of specially molded cork, $3\frac{7}{8}$ inches outside and $1\frac{1}{2}$ inches inside diameter and $\frac{5}{8}$ inches thick. It is treated with a viscous insulating compound which will not oxidise or crack. With a hooked-shaped scraper or a small emery wheel the scale is removed from the surfaces on rail and fish plate where the cases are to be placed. The center of each of these surfaces is rubbed with a special alloy, discovered by Mr. Edison, which instantly changes any iron rust to pure metallic iron and forms a silver-like deposit which repels water and will not corrode. See Figs. 1, 2, 3 and 4.

A permanent iron amalgam, which has been considered a chemical impossibility, is thus produced upon the surfaces, and in this lies the cause of the low resistance and durability of the joint. One side of the case is then slightly warmed and thus made viscous, and placed upon the prepared surface of the web of the rail. As soon as it sticks a plug of the plastic metal, surrounded by a steel spring, is put into the hole, which slants downwards toward the base of the rail, so as to retain the free liquid metal in the compound. A second case and plug are similarly placed on the adjoining rail, and the fish plate bolted down. The tightening of the bolts compresses the cork to half its former thickness and makes its surfaces stick firmly to the steel, the spring forming a distance piece to prevent too much compression. The fish plate nuts are locked in position, but even if they should slacken and the plate drop back $\frac{1}{4}$ of an inch, the cork will expand or be pulled out to its former thickness by the adhesion of the insulating compound to the steel, and the plastic metal, by gravity and the expansion of the spring, will maintain a perfect electrical contact. In fact, it is hardly accurate to call this junction a "contact" since the affinity is so great between the prepared surfaces of the steel and the metal of the bond, that it is difficult to separate them; and the conductivity of the joint is practically equal to that of the rail itself.

The plastic metal cannot be injured by the blows of passing wheels. It is sealed from air and water and will remain plastic indefinitely if properly applied. The elasticity of the cork permits the movement of the rail and fish plate due to temperature expansion and contraction. Even though water or any acid or alkali, likely to be encountered in the streets, should get to the plastic metal it cannot affect it nor corrode under the prepared surface of the steel, into which the amalgam seems to penetrate.

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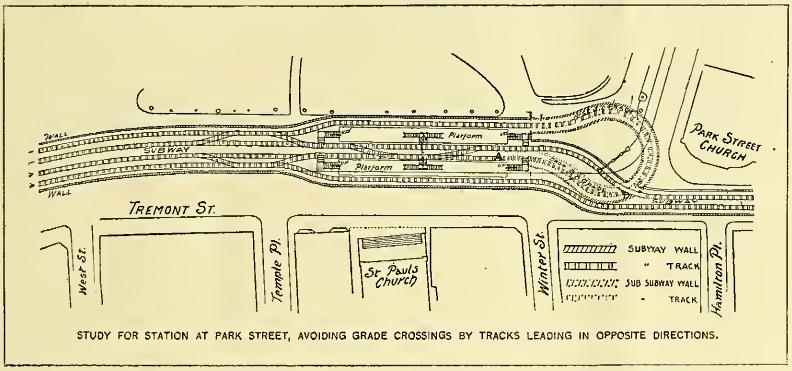
* For the cuts illustrating this article we are indebted to the *Electrical Engineer*, of New York.

The remarkable conductivity of the joint and its low drop is shown by the tables below. For cross-bonding or feeder-wire connections a third bond is placed on the rail near the end of the fish plate and is clamped upon a tinned strip of sheet copper which projects beyond the plate far enough to be soldered to the wire. As this bond has a conductivity equal to the rail itself, a large reduction in feeder wire can be made by its use. It is cheaper than copper of half its carrying capacity and will last as long as the fish plate. The saving of motive power from its use may be calculated from the following tables of measurements made at the Edison laboratory in the presence of a number of prominent electric railway engineers. The copper bond tested had the most perfect mechanical contact that could be devised, and was perfectly bright and clean. The Weston instruments used had just been calibrated, and the readings were made by the visitors. It is evident that no road using copper boud wires can be operated with proper economy of power, as the transmission loss with copper is 7 to 10 times greater than the loss with the plastic bond.



STUDY FOR STATION AT PARK STREET, AVOIDING GRADE CROSSINGS BY TRACKS LEADING IN OPPOSITE DIRECTIONS.

FIG. 1.—THE FIRST SECTION OF THE BOSTON SUBWAY TO BE CONSTRUCTED.

Amperes.	Copper.		Plastic Bond.			Amperes.
	Copper Bond ⅝ in. diameter, with best mechanical contact of ten times its cross section; surfaces bright.	Drop of same due to copper resistance only.	90 lb. Girder Rail joint with Plastic Rail Bond.	Same with fish plate loosened ¼ of an inch.	60 lb. T Rail joint with Plastic Rail Bond.	
50	Drop 0.05 v'lts	0.0025	0.0025	0.0025	0.005	50
100	0.08	0.005	0.005	0.005	0.009	100
200	0.15	0.01	0.02	0.01	0.012	200
300	0.215	0.0175	0.0125	0.0125	0.0167	300
400	0.27	0.0225	0.02	0.02	0.025	400
500	0.315	0.03	0.0225	0.0225	0.034	500
600	0.35	0.035	0.03	0.03	0.037	600
700	0.38	0.01	0.035	0.035	0.041	700
800	0.41	0.0475	0.04	0.04	0.05	800
900	0.45	0.05	0.045	0.045	0.067	900
1,000	0.455	0.06	0.0475	0.0475	0.075	1,000
1,100	0.46	0.065	0.05	0.05	0.083	1,100
1,200	0.47	0.07	0.06	0.06	0.091	1,200
1,300	0.49	0.0775	0.0625	0.0625	0.098	1,300
1,400	0.50	0.0825	0.065	0.065	0.106	1,400
1,500	0.515	0.09	0.07	0.07	0.114	1,500

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DUTY OF MOTORMEN

The New York Court of Appeals has reversed the decision of the city court in the important case of Richard Keenan, administrator, against the Brooklyn City Railroad Company, in which the plaintiff originally recovered judgment for $5,550. The suit was for damages for the death of James Keenan, aged five years, who was killed by a Third avenue trolley car on May 12, 1893. It was claimed on the trial that the child was knocked down by a fast moving car as he was running across the street, and that before the car could be stopped he was dragged 25 or 30 feet. The evidence showed that when the boy ran upon the track the car was within 10 or 12 feet of him, and that the motorman stopped it as quickly as he could do so. Many witnesses were examined and at the close of the evidence Morris & Whitehouse, representing the street railway company, contended that the case should be dismissed. Judge Clement refused to dismiss, and the jury rendered a verdict for the boy's father for the full amount sued for, with interest. The company appealed the case, and in May last the general term affirmed the judgment. Judge Van Wyck, writing the opinion, held that the jury was justified in holding that the motorman was to blame in not discovering the approach of the child before he got upon the track. The case was then taken to the Court of Appeals.

The Court of Appeals has evidently followed its decision of a year or more ago, in the case of Fenton against the Second Avenue Railroad Company of New York city. There a little boy in crossing the street on a run fell upon the track 20 feet in front of an approaching car. Before the car could be stopped the boy was run over and killed. In deciding that no recovery could be had the court declared that, if in a case of a sudden emergency, such as was presented in that case, the driver did all in his power to stop his car after the child was in actual peril upon the track, he did all that the law required of him. It is claimed that the majority of accidents to children while crossing the tracks of the trolley roads are caused by their heedlessness in running across the tracks so close to the approaching cars that the motormen cannot possibly succeed in saving them.

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BOSTON SUBWAY.

Preparations for the construction of the Boston subway, through which street cars will pass in the crowded district of the city, are already under way. A contract for the steel work that will be needed was awarded last week to the Pennsylvania Steel Company. A report of the plan which the Subway Commission proposes to follow was published in the Street Railway Gazette of Feb. 23.

The first portion, beginning in the Public Garden and ending at Park street, shown in the accompanying map, will probably be finished and in operation before the entire system is completed. Into this section the cars now coming from Huntington avenue and Boylston street, and turning back at the Tremont House, will enter, pass around the loop at Park street, and return on their various routes. This use will at once relieve Tremont street by the Common from its present congested condition, and permit an increase of cars for the proper accommodation of the public.

The appearance of the proposed Park Square station is shown in the illustration, Fig. 2. As the space from the under side of the roof of the subway to the surface of the street will be 3 feet, the top of the rail will be 17 feet below the surface of the street, and as the platform will, as a rule, be on a level with the lower step of the car, the total ascent or descent for passengers will be about 16 feet. The staircases to the subway will be covered and inclosed, and persons standing on the platforms of the subway will be absolutely protected from the elements. The platforms are so-called "island" platforms—that is, they have a track on either side of them. By this arrangement, when the access to the platform is by a staircase from above, all necessity for crossing the tracks on a level is avoided.

A count was taken on Saturday before last Christmas of the number of people taking and leaving the cars in the district shown in Fig. 1. This count was taken for the purpose of determining what should be the capacity of the station platforms upon which the business of all these stopping-places is to be concentrated. It was found that the total number of people who got on or off the cars within the district named, between the hours of 6 in the morning and 12 at night, was 63,350. Of this, the number who got off from the inward or north-bound cars was 27,851, and the maximum number for any one hour was 3,450, being for the hour from 8 to 9 A. M. The number of persons who got on the outward or south-bound cars, from 6 A. M. to 12 midnight, was 30,027, the maximum number for any one hour being 3,406, for the hour from 5 to 6 P. M. These figures are interesting, as showing what work the station platforms will be called upon to do. If only one car at a time should be standing at the station platform on each track, and if it were allowed a half-minute for its stop, there would be two cars per minute on each track, or four cars per minute on the two tracks. If each one of these cars should carry off 20 passengers, the total number carried away per minute would be 80, and the total number per hour 4,800, a number 40 per cent. in excess of the great and unusual crowd which thronged the streets on the Saturday before Christmas. If two or three cars, either singly or in train, stop on each side of the station platform at the same time, then its capacity would be doubled or trebled. The platforms at this station are 150 feet in length.

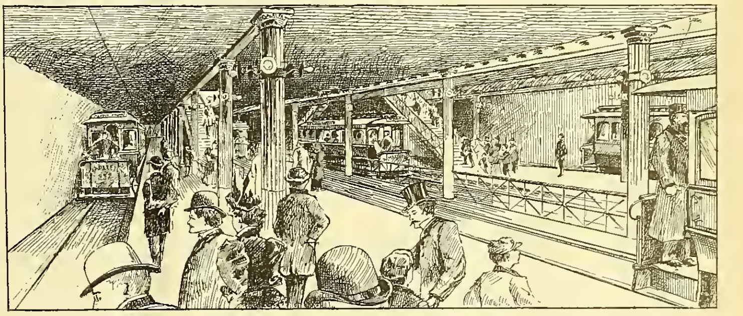

FIG. 2.—BOSTON SUBWAY—PROPOSED PARK SREET STATION.

OPPOSITION OF STEAM RAILROADS TO TROLLEY LINE EXTENSIONS IN CONNECTICUT.

The steam railroad companies are making a bitter fight against the grant of charters to electric railway companies by the Connecticut Legislature. On Tuesday last the railroad committee of the Legislature held a hearing, at which the protests of the steam railroad companies were presented.

Vice-President Hall, of the New York, New Haven & Hartford road, stated that two years ago, when the Legislature was asked to charter various local street railroad enterprises, the steam roads interposed no objection, but since then it has been developed that these chartered enterprises had fallen into the control of syndicates of New York, Pennsylvania, New Jersey and Massachusetts capitalists, whose object was to make money by bond issues, and to construct lines paralleling the steam roads between all the larger places. Scores of such schemes, he said, were presented to the present Legislature, asking connecting links which will establish, in effect, roads running long distances and parallel to existing steam roads.

Judge Hall submitted a map, showing that existing and proposed electric roads actually parallel the New York, New Haven & Hartford from the New York line to Springfield. He also presented the following statistics showing the depreciation in receipt of fares during the past three months, which are traced directly to the competition by electric railroads where they parallel the New Haven lines between stations:

Between Norwalk and Rowayton, a loss of 50 per cent. of the entire business. Between Bridgeport and Southport, a loss of 80 per cent. of all business. Between Bridgeport and Stratford, $35 per day. Between New Haven and Woodmont station, 50 per cent. of all business. Between New Haven and West Haven, 70 per cent. of all business. Between Wallingford and Meriden, 30 per cent. of all business. Between New Haven and Lake Saltonstall, 45 per cent. of all business. Between Meriden and Yalesville, about 90 per cent. of all business. Between Southington and Plantville, practically all the business. Between Unionville and Hartford, 40 per cent. of all business. Between Hartford and Glastonbury, 30 per cent. of all business. Between Derby, Ansonia and Birmingham, 90 per cent. of all business. Between Ansonia and Derby, $1,500 a year. Between Naugatuck and Waterbury, $300 a month. Between Union City and Waterbury, $170 per month. Between Waterbury and Naugatuck, 90 per cent. of all business. Between Winnipauk and South Norwalk, 50 per cent. of all business. Between South Norwalk and Winnipauk, 90 per cent. of all business. Between Norwalk and Royalton, 50 per cent. of all business. Between Danbury and Bethel, 75 per cent. of all business.

E. D. Robbins, local counsel for the New York & New England road, also referred to the syndicate backing of Connecticut electric roads, and complained that it is proposed to parallel the New York & New England from Rockville, through Hartford, to New Britain and Bristol, which is the most profitable section of the road in the State.

President Coit, of the New London Northern, argued that electric roads should be put under the supervision of the State Railroad Commissioners, and be held subject to all the restrictions imposed on steam roads.

Director Henry C. Robinson, of the New York, New Haven & Hartford Railroad, indorsed this proposition, and argued that, while the development of electric roads should be encouraged in cities and between points in rural districts, it was unfair to the vested rights of steam roads to permit competition by parallel lines between the larger places. It was decided to hear the views of the street railway companies at a later date.

During last week despatches have appeared in the daily papers asserting that the Consolidated Railroad Company was formulating plans to purchase several trolley railroads along its lines in Connecticut, including the Bridgeport Traction, the Norwalk Tramway, the Westport and Saugatuck Horse Railroad Company, the Westport and Southport Tramway Company, and such other street railroads along its lines, the control of which would best serve Consolidated interests. The Consolidated, it was said, had become convinced that the extension of electric roads under old charters and under new ones, for which so many petitions had been presented to the Legislature, would parallel its lines to such an extent as to affect its income from short-distance traffic. To fight all these roads, it was found, would be expensive. Favoring the petitions for charters of such as could best be dealt with, and buying such others as it needed, it was thought, would be the best method of continuing to hold the carrying trade in Connecticut.

The report was emphatically denied by Vice-President Hall. He said:

"The New Haven Company has made no attempts whatever to purchase an interest in the Bridgeport Traction, the Norwalk, the Westport and Saugatuck, or the Stamford and Stratford electric lines, as reported. In fact, we have made no bids for interest in any electric lines in the State. We shall not compromise with the electric roads at all in our fight with them in paralleling the State. When we get ready to equip our line with electricity we have a number of branch roads which will be used to check competition from the electric lines mentioned."

NEW ISSUE OF PHILADELPHIA TRACTION STOCK.

At a special meeting of the stockholders of the Philadelphia Traction Company last Wednesday a resolution was adopted authorizing the directors to increase the capital stock of the company by 100,000 shares, to be issued in such a manner as the directors should direct, provided the stock should be issued at the par value of $50 per share.

The present capital stock of the company comprises 300,000 shares at $50 par, of which 100,000 were issued within a year past, and are now full paid, the last instalment having been paid in January. The present capitalization is $15,000,000. The new shares will increase the capital stock to $20,000,000. The capital authorized is $30,000,000.

President P. A. B. Widener made a brief address, in the course of which he said:

"We feel justified in saying, at this time, that the present will be the final issue of stock you will be called upon to make, as the proceeds of its sale, together with some securities the company received from its branch lines, will pay for the new work in hand or at present contemplated, as well as make ample provision for the floating debt. The future policy of your management will be to make only such extensions to existing lines in the system as may be required by the natural growth in their respective territories. We will construct no new suburban extensions, as we now fully realize the fact that increased mileage in undeveloped fields does not bring with it an equitable increase in the earnings.

"I want to say right here that the moneys expended in the past two years have not been entirely upon the old routes; a large portion of it went to secure new and profitable lines, including the Morris and Tasker, Catharine and Bainbridge, Twenty-second and Allegheny (upon which $1,000,000 was expended) and the York and Dauphin, which we consider one of the best properties in the system, reaching, as it does, the thickly populated districts of Richmond and Kensington. From the proceeds of the stock sold, we have also purchased large amounts of stock of leased lines.

"Your stock does not contain a drop of water. For every dollar's worth issued there has been received a dollar in return; there has never been any stock issued for less than par, and on 200,000 shares that were sold you received a premium of $700,000. The money received from these issues was all put in your property, and it could be sold to-day, exclusive of your valuable franchises, dollar for dollar. The Philadelphia Traction Company owns a large amount of real estate, all the machinery used on the entire system and the entire car equipment. In fact, you possess more for the money expended than any other corporation in the country. Of the securities of companies in the system your company owns the entire capital stock of the Seventeenth and Nineteenth, 6,046 shares of the Union, 7,859 shares of the West Philadelphia, 11,756 shares (out of a total of 12,000 shares) of the Empire, and the entire capital stocks of the Walnut Street Connecting, the Marshall Street Company, the Catherine and Bainbridge, the Kessler Street and the Twenty-second Street and Allegheny Avenue Companies; also small lots of other companies in the system.

"Another point to which I desire to call your attention is that the rentals of nearly all your leased lines have now reached their maximum amounts. The wisdom of changing the motive power has already been fully demonstrated, as it has increased your car mileage from 40 to 60 per cent.—and in some cases the latter figure has been exceeded—in the same number of working hours. This is the great gain of electric power over horses. Were it not for this, the change in motive power would have been valueless. The change has made it possible for us to handle promptly and safely all traffic which may be tendered—a fact that was fully proven last year at the football games. In conclusion, I would say that the present issue of stock in no wise endangers the present dividend rate—in fact, it, or even a larger dividend can easily be paid from the surplus earnings of your company."

RATING FEED-WATER HEATERS.

The appended resolutions have been adopted by the Feed-Water Heater Manufacturers' Association in the United States. The method of rating feed-water heaters has been recently discussed by the American Society of Mechanical Engineers, and the need for a change in existing methods seems to be undoubted. The movement which these resolutions indicate is one in the direction of fair and open methods, as opposed to evasion and concealment. It is as much in the interest of the users of heaters as it certainly is in the interest of all makers who do not object to telling the buyer just what they are trying to sell him. Every manufacturer of closed feed-water heaters in the United States, so far as known, has been invited to join the Association and to subscribe to its resolutions. The term horse-power, as applied to feed-water heaters, is an exceedingly loose and indefinite phrase. The work which a feed-water heater has to do depends upon the number of pounds of water in the shape of steam that an engine requires per hour. A simple engine of the cheapest grade may use, say 50 pounds of water per horse power per hour; an average engine will use perhaps 30 pounds of water, while a high-grade engine will cut the consumption of water down to something like 15 pounds per horse power per hour. Again, the steam which is used to heat this water will in the case of a simple engine have a temperature of 212 degrees, while in the engines of high grade it may have to do its work with a temperature of less than 150 degrees. It is evident, therefore, that the term horse power cannot be applied to heaters without some explanation as to what is meant by the term in each particular case. The resolutions have been signed by the Taunton Locomotive Manufacturing Company, makers of the Wainwright Feed-Water Heater; Benj. F. Kelley & Son, makers of the Berryman Feed-Water Heater; Wm. Baragwanath & Son, makers of the Baragwanath Feed-Water Heater; the Goubert Manufacturing Company, makers of the Goubert Feed-Water Heater; the National Pipe Bending Company, makers of the National Feed-Water Heater; Robert Wetherill & Co., makers of the Wetherill Feed-Water Heater; Keystone Engine & Machine Works, makers of the Keystone Feed-Water Heater. The resolutions are as follows:

We, certain manufacturers of closed feed-water heaters, in convention assembled, declaring

That a better understanding among ourselves and also between each of us and our customers, in the matter of rating of feed-water heaters, is much to be desired, do hereby

Resolve, That we believe that the only proper rating for feed-water heaters is one which is based upon the square feet of heating surface contained in the heater. For the purpose of giving practical shape to this belief, we do further

Resolve, that we hereby agree that for the future we will in each and every case in which we are called upon to make prices upon heaters state the exact number of square feet of surface which we are offering; to give further effect to this action, we

Resolve, that we will in each and every case state without reservation, both in our printed catalogues and in our specifications, the diameter of the tubes, the number of lineal feet thereof and the total square feet of heating surface in each heater offered.

Resolved further, that the secretary be requested to transmit a copy of these resolutions to every manufacturer of closed heaters in the United States.

And we hereby agree to live up to the spirit and the letter of the foregoing and to bind ourselves so to do by our signatures affixed below.

Resolved finally, that the secretary be requested to invite all closed heater manufacturers of the United States to join this association and to subscribe to the foregoing resolutions.

NOTES ON RECENT ELECTRICAL ENGINEERING DEVELOPMENTS IN FRANCE AND ENGLAND.

PART I.

At the last meeting of the American Institute of Electrical Engineers in New York City, H. Ward Leonard read his paper entitled "Notes on Recent Electrical Engineering Developments in France and England."[*] After the presentation of the paper an interesting discussion took place. A summary of the remarks on several of the topics touched upon is given herewith:

DISCUSSION.

Townsend Wolcott: I would like to ask Mr. Leonard if he can account for the difference in the efficiency of the Parsons and the Laval turbines. There seems to be, according to the figures given in the paper, a great deal of difference in favor of the Parsons. I was not aware that there was any such difference. In fact, I thought that, if there was any difference, the Laval was rather the better so far as coal consumption per horse power was concerned.

Mr. Leonard: I do not think that there is any difference, and if there is a difference I am inclined to think, also, that it is in favor of the Laval. The tests made by Professors Kennedy and Ewing were upon larger sized units than the ones in the case of the Laval. I fancy that it may be that the smaller size was influential.

Another point which may perhaps be a little confusing is this: That the consumption of steam quoted for the Laval steam turbine of 20 pounds of water per horse power hour is per horse power actually delivered, as you may say, in the generator armature. In other words, the friction of the bearing and the loss in the gearing is eliminated, and it is a horse power actually delivered, available in producing electric energy—of course, the efficiency of the armature is one thing left to consider—whereas the figures I quoted for indicated horse power are, of course, at the beginning before any of the friction is eliminated.

Dr. Chas. E. Emery: The author of the paper has in a racy and attractive way brought to the attention of those present matters in which he has been interested and instructed abroad. For this pleasant duty, well performed, I am personally much obliged to Mr. Leonard.

Taking up my marginal notes in order, the paper states that the Parsons steam turbine delivers one kilowatt for 28 lbs. of feed water, and continues: "This is equivalent to about 15.7 lbs. of water per indicated horse power per hour." The difference is so great it would seem that these figures need revision.[†]

I have been interested in considering the possibilities of the Parsons and the Laval steam turbines. The high speed should permit the use of a small and comparatively cheap dynamo, and eventually the engines should not be as expensive as ordinary engines. Moreover, the very small space required is of importance in a large city. I have wondered why the turbines have not been introduced here. I made a special examination of the Laval steam turbine at the Columbian Exposition, and though I had a special invitation and wore a judge's badge, I could not get the operator to put a load of more than three or four kilowatts on an engine rated at 15 H. P., the excuse being that there was water in the steam. The reported tests of this turbine are very satisfactory, but it is a question if it has yet been put in commercial form.

The description of the Heilmann electric locomotive and its operation is certainly very interesting, and involves some important considerations. It is fair to say that I had not thought of this system respectfully until I read the paper. It did seem to be impossible, when there are steam engines and a steam boiler already on a locomotive, to install an electric plant in addition to a steam plant on a special car, and in that roundabout way make a locomotive which would in any respect be more efficient than the direct use of steam applied to driving wheels in the first place. A few facts and some very simple calculations show that the idea is not as ridiculous as it seems. It would be unreasonable to dispute the statement that the cost of the power from an ordinary locomotive is double that of stationary engines of the best type. There are two reasons for this; one, the necessity of obtaining such an enormous power from a locomotive boiler which with the customary construction must be put in a certain place under limited conditions, the effect of all of which is to bring the evaporation down to 5, or at most, 7 pounds, instead of 8 or 9. The other is the difficulty of obtaining economy with the simple arrangements of valve gear which has been adopted and with such variable piston speeds as are necessary. If, therefore, the steam plant of the Heilmann locomotive can be operated, for one-half the fuel, or anywhere near that, this saving, not considering interest charges, will more than compensate for the losses incident to the generation and utilization of electric current, even if the 50 per cent. extra weight of the Heilmann locomotive be considered as to that extent reducing the weight of the train. The question immediately arises, however: Why not adopt the distinguishing feature of the Heilmann steam plant to a steam locomotive? It is perfectly possible to mount a boiler of larger size on a platform and to make locomotive steam cylinders which will operate as economically as those of an engine mounted on a platform itself, even if we have to increase the size of the drivers to bring down the number of revolutions of the engine. Were this done, the locomotive would be as economical as the steam plant of the Heilmann locomotive, and the intervening electric machinery would produce loss instead of gain. That is, when the progress that has been made in the construction of the Heilmann locomotive is analyzed along more general engineering lines, the improvement suggested is one in locomotives, and not specially in electric locomotives. Curiously enough the general features of the system have been already worked out for ordinary locomotives, but were so far ahead of the times that they have not been generally adopted. What was called the Farlie locomotive, built some years ago, had two boilers mounted on a plaform supported on two trucks containing only driving wheels. The steam was introduced to the cylinders through ball and socket joints. The system operated well, all the weight was on the drivers, and I think some of the original engines are still at work in one of the South American States. The Mason Locomotive Works took up the system later, using a single boiler, and with one propelling truck containing drivers at one end and an ordinray truck at the other. This arrangement enabled short curves to be run on suburban routes, but Mr. Forney, now present with us, showed that this could be done with a locomotive of the ordinary type, carrying its own tender on the frame: but supported by a truck, as evidenced in the locomotives on the elevated roads, and the Mason system has not been extended. The success of the Heilmann system will then only show the desirability of reviving the Farlie system, perhaps using only a single boiler of large size.

At present, as Mr. Leonard suggests, it is well to encourage the development of the Heilmann system as a means of ascertaining the desirable details of a practical electrical locomotive, even if the steam machinery afterward be taken off, and the current supplied by some modification of the trolley system.

Herbert Lloyd: The conclusions Mr. Leonard comes to, resulting from his inspection of a single battery plant in Paris, are, I think, a little unjust to accumulators. His figure of $107 per kilowatt for three hours' discharge, about conforms to the American practice, but the statement that the battery worked at this rate will not have an efficiency of over 60 per cent. is, I think, erroneous. All the large batteries installed in this country have been guaranteed at a much higher figure than 60; 75 is more common. In comparing the relative first cost of battery plant and direct power plant, Mr. Leonard gives a first cost for a direct plant of $50 per kilowatt of output as against $107 for a storage plant of the same output. I will quote the remarks of Mr. Edgar, of Boston, at the Cleveland Convention, last week. Mr. Edgar says:

> "A first-class steam plant costs $100 a horse-power; everything inside of the building. That is being done today. The battery costs us a little over $50 a horse-power to do the maximum work."

One hundred dollars a horse-power for direct plant means of course $133 per kilowatt, as against $107 for battery, taking Mr. Leonard's figures. I have had occasion within the past 30 days to get an estimate on a direct electric power plant, and the figure of $100 per horse-power is the result of my efforts.

Were the comparison made by Mr. Leonard between the first cost of the two systems correct, his later remarks as to the profitable application of a battery with a 40 per cent. load factor, would have some weight, but with batteries costing less per kilowatt of output than a direct plant, that contention falls.

A. E. Kennedy: I think we are much indebted to Mr. Leonard for his interesting paper. A subject of this kind is always interesting, because, while proverbially, comparisons are sometimes odius, practically, they are also sometimes very pleasant, and by seeing what our neighbors are doing we can often gain some advantage for ourselves.

There are three points in this paper I would like to mention. The first is that this country has suffered by having the electrical industry in the control of large corporations, and then Mr. Leonard goes on to state that dynamos and engines are better here than they are anywhere. I suppose Mr. Leonard would not say that lamps are worse here than they are anywhere else, or that motors are worse here than they are anywhere else. So that we are forced to the conclusion that the superiority abroad must lie in the system of distribution, because there is nothing left but the systems to account for it. I can scarcely imagine that it can be maintained that in the commercial application of distribution there is a superiority in European countries, because I think you have only to take up a map of England's electrical distribution systems, for example, to see that the question of systems is a very rife one, and that there is no apparent uniformity of opinion as to which system is the best to employ, even under any given conditions. Thus it is stated by Mr. Leonard that under the most unfavorable conditions he can possibly imagine, an alternating system has been put in in the middle of the city of London. He also mentions that dynamos cost much less here than abroad, and this in a country of corporate interference. Is not that an argument in favor of the fact that under the influence of aggregated capital, processes of manufacture may have been so perfected as to greatly reduce the cost of construction; and while no doubt the effect of large corporations is to limit and interfere in some directions with electrical applications, yet in this compensatory world the diminished price of electrical apparatus is an evidence of one beneficent effect of large corporations.

The second point is where the allusion is made to the cost of this storage battery as being capable of supplying 8,000 10-C. P. lamps for three hours, and costing about $30,000, meaning $107 per K. W. That is evidently based on an estimate of an inefficiency in the lamps of 3½ watts per candle. I would like to ask whether that 8,000 lamps is not the true estimate, and that 4½ and even 5 watts per candle would not be a much more fair basis to take, in which the cost would come to $75 or $83 per K. W.

M. N. Forney: There are some things contained in this paper in relation to the Heilmann locomotive which interest me very much. I might say in the beginning that I know very little about electricity, but I know, perhaps, something about locomotives. There are several statements in this paper which are urged in favor of the locomotive, and which, perhaps, could hardly go entirely to the credit of the electric locomotive. For example, it is said that the Heilmann locomotive rests upon 16 wheels, and that Mr. Heilmann "is able to carry a larger boiler, and hence does not have to crowd it to such a wasteful point." Now, it is not quite clear to me why you are not able on ordinary locomotive to carry as large a boiler on 16 wheels as on an electric locomotive. An ordinary locomotive and tender is always carried on 16 wheels, although the weights are not exactly the same, the Heilmann locomotive being heavier. The electric locomotive must, in addition to the engine and boiler and the other appliances, carry its electric machinery besides. So that it appears as though the old steam locomotive has something to say for its side.

There is another statement in which it is said that "probably at least one-third of the cost of maintenance of the roadbed and the locomotives for high speed service could be traced directly to this destructive hammer blow and side thrust." Now it would be interesting to know on what sort of evidence that statement is based. I confess that after being a student of railroad matters for a good while, I have never heard that so large a proportion of the repairs of roadbed can be assigned to any such cause as that. It is very true that experiments have been made showing that some very destructive action occurs in locomotives, in which there is an excessive amount of counterbalance. A good many cases have been quoted in which it is said that rails have been bent, and the experiments made at Purdue University also show that a very high speeds, with excessive counterbalance, the wheels raised up entirely clear of the rails. But it is also shown by the same experiments that there are substantially no injurious results when the locomotive is counterbalanced in a reasonable way.

Again, it is said that the cost of the Heilmann locomotive is $30,000. Now an ordinary passenger locomotive of the largest size can be obtained for about $10,000 to $12,000 at the present time. There would, therefore, be a difference of about $18,000 to $20,000 in favor of the present steam lomomotive. I think hardly any prudent business man would venture to make an investment of that kind without allowing 10 per cent. on the extra cost of replacing it. That would give you an excess of interest account for the Heilmann locomotive of $1,800 to $2,000. You may take it as a rough statement that a locomotive will burn per year about $2,500 worth of coal. I am taking a rough average through the country. As you have $1,800 to $2,000 excess of interest for the Heilmann locomotive you would have to do the same amount of work with $500 to $700 worth of coal with the Heilmann locomotive that we are now doing with $2,500 worth on the steam locomotive.

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[*] See *Street Railway Gazette*, March 2, 1895.

[†] This may be explained by using rather low efficiencies. Twenty-eight pounds per kilowatt equals 20.83 pounds per E. H. P., of which 15.7 is practically .75, which is the joint efficiency of the engine and dynamo and corresponds approximately to 88 per cent. for the engine and 90 per cent. for the dynpmo, or vice versa.

I am entirely ignorant of the appliances used on the Heilmann locomotive, and there may be features there which would give a very great advantage in locomotive practice. But from the showing that is presented here, it seems to me that there is a good deal still to be said in favor of the steam locomotive.

DR. CARY T. HUTCHINSON: It may be interesting to give some information about a large electric locomotive which has just been finished by the Baldwin Locomotive Works. This locomotive has eight drivers connected rigidly by side bars, making a wheel-base ot 16 feet, the length over all being about 30 feet, The weight is 133,000 pounds uniformly distributed on the eight drivers, giving 16,700 pounds on each driver. There are four motors, one on each axle, the motors being built directly on the axle without springs of any kind between the armature and the axles.

The machine has a capacity, on a four-hour test, of 1,000 H. P. at a speed of 35 miles per hour. The regulation is the series parallel. The motor being: 1st, all in series; 2nd, two series by two in parallel; 3d, all four in parallel. There is also a resistance intended for use on first position in starting. The lowest speed, without resistance, is about seven miles per hour.

A test recently made at the Baldwin Locomotive Works showed an efficiency of more than 92 per cent. when operating 1,000 H. P.

The motors are designed so that they will work without sparking with full current on the armature at one-half normal field strength. That is to say, they will operate at any speed from 35 miles per hour up to 65 miles per hour at the same power, the drawbar pull varying inversely as the speed. At speeds below 35 miles per hour the drawbar pull is constant, the power, therefore, being directly proportional to the speed.

The smoothness and absence of vibration was very noticeable in the test referred to. The entire machine was supported on four jacks, without bracings; when running with full torque there was scarcely any shaking.

W. L. BLISS: Mr. Leonard says: "But regardless of an abundant supply of steam from the boiler, we find ourselves greatly limited in power for steam locomotive practice at high speed. because of the wire drawing of the steam and difficulty of properly exhausting when we run our locomotive at its highest speed."

He states further: "The engine in practice" (which I suppose is the engine which is driving the dynamo) "is varied in speed from perhaps 50 to 500 revolutions, and the strength of the generator field from zero to its maximum strength." I have made a rough estimate here as to what that speed represented. In the first place, Mr. Leonard complains that the high speed of the steam locomotive causes wire drawing of, and difficulty in exhausting the steam, whereas these troubles are obviated in the Heilmann locomotive. He assumes, however, that in the Heilmann locomotive the prime mover runs up as high as 500 revolutions. I have made a little calculation on the margin. I remember that the Empire State locomotive, No. 909, has 86-inch driving wheels. That would be a circumference of 22.2 feet. At 60 miles per hour the drivers would make 236 R. P. M., which is less than one-half as fast as the Heilmann locomotive would be going to make the same speed, on the assumption that the latter makes 60 miles per hour at 500 revolutions. If we go to 120 miles per hour, or 112 miles per hour, which is the record of the Empire State (locomotive), we should not be running the same quite as fast as the Heilmann prime mover, so that I should think there would be no more difficulty with high piston speed and wire drawing in the Empire State than in the Heilmann locomotive, for the engines are evidently operating at nearly the same speed.

MR. RICHARD FLEMING: In connection with the cost per kilowatt of the European dynamos, I would like to ask Mr. Leonard why the cost of the dynamos is higher there than here. Are they more liberally proportioned, or is the workmanship so much superior to ours that they have to charge more for them? Why is it? I would also like to state in connection with the use of the three-wire system on alternating lines, that in the winter of 1890-91 I built a small plant in the far West, in Washington, where I transformed from 1,000 volts in the primary to 208 volts in the secondary, using the Edison three-wire system. They were compelled to change from the regular continuous current three-wire system to the alternating, and used the same wire. We used the standard Thomson-Houston transformer with primary windings in multiple and secondary windings in series.

(TO BE CONTINUED.)

PHILADELPHIA TROLLEY MAIL SERVICE.

Postmaster Carr of Philadelphia has decided to utilize the Fourth and Eighth Street electric line of Philadelphia for carrying mail from the Post Office to the sub-stations. It is proposed to use a trail car, 16 feet in length, which will have painted on the sides "United States mail." The car will be white, with lettering in gold, and the height of the letters not to be less than six inches. The plan of the car takes in the whole space, and not, as in Brooklyn, half only. It is thought that the safety of the mail will be better secured by using the entire car. Moreover, the distribution of the mail in transit, it is believed, can be more effectively done if the greater space is provided, and because of the large number of stations to be supplied on this route. It will be heated and lighted by electricity, and when the quantity of the mail requires, an electric cancelling machine may be used, and will be furnished with letter cases, distributing tables, opening tables, pouch racks and piling stalls, and the letters may be mailed on the car by the public through a letter chute at the points where the cars stop to take on and let off passengers.

In speaking of the change, Postmaster Carr said: "It is hoped that much benefit by this distribution will be felt in the inter-station service. From the accounts kept of the distribution in the railway mail service, it appears that only 36 per cent. of the arriving mail is distributed to stations in transit or in distant post-offices, and the rest of the mail, or 64 per cent., is distributed twice after its arrival in this city, once in the central office, and afterwards at the sub-station, before it reaches the carrier, making one of the elements of inefficiency in the inter-station service, and the trolleys will give more rapid transit after the mail arrives."

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MOTOR CAR CONTROLLERS.

A correspondent signing himself "N. L. T.," writes as follows to the Brooklyn *Eagle* in reference to the existing methods of controlling electric cars:

The present system of control is a makeshift. It is crude, unreliable and expensive in operation. As at present applied it is open to considerable improvement, and in this direction inventors have been working. I am in communication every day with one of the foremost of contemporary inventors—a man whose ability in electrical science has been and is generally recognized. This gentleman has recently perfected a device by means of which the motive power of electrically propelled vehicles is constantly under control, and this device can be operated by a single forward or backward movement of a lever by the motorman. In connection therewith the brake can be managed, and by one movement of the hand both motor and brake can be controlled, if desired. This system is not only effective, but scientific and economical, and is indorsed by prominent electricians. As to the matter of efficient brakes, there are now on the market brakes which can hardly be improved upon, but the difficulty has been in the past to induce railway managers to adopt the same on account of the first cost.

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FINANCIAL NOTES.

Brinton Park Receivership.—A. Vandwort, of New Castle, Pa., has been appointed receiver of the Brinton Park Street Railway Company.

New Bond Issue in Lincoln, Neb.—The Lincoln Electric Street Railway Company has given a mortgage to the St. Louis Trust Company for $50,000 on all its personal and real property to pay a floating indebtedness. The loan is secured by the issuance of 100 bonds of the sum of $500 each and due Jan. 1, 1915.

Reported Purchase of Mexican Street Railways.—It is reported that the Steam Valley Railroad and the Federal District Street Railroad system of the city of Mexico have just been purchased by a New York syndicate, the consideration being $8,000,000. The Guggenheimers of New York and Philadelphia are heavy stockholders in the company.

Marion (Ind.) Railway Sold.—The electric railway of Marion was sold last week by order of the United States Circuit Court in the suit brought by the Metropolitan Trust Company of New York. Warren McWhinney and Charles R. Holderman were the purchasers. They hold $60,000 of the railway company's bonds, and got the property, which cost $53,000 for $30,000.

New Purchaser of the Sioux City Elevated.—The Sioux City (Ia.), Elevated Road was recently sold to the Northern Car Company, of Minneapolis, for $50,000. It is now announced that the Minneapolis purchasers of the road have sold it to the King Iron Bridge Company, and that company will virtually own and operate it. This being the case, the King Iron Bridge Company will establish a large foundry and shops here for their Western works.

Annual Meeting of the Philadelphia Omnibus Company.—The annual meeting of the Omnibus Company General, of Philadelphia. which is owned by the Electric Traction & Philadelphia Traction Companies was held this week. The annual report stated that over 6,000,000 passengers were carried last year, and that, while the competition of the trolley lines had caused some diminution in the travel, it had not been great, and business had been conducted at a satisfactory profit.

Bond Issue in Worcester.—The stockholders of the Worcester (Mass.) and Suburban Street Railway Company have voted to authorize the issue of $200,000. five per cent., 30-year bonds, to cover the indebtedness of the company, and to make the necessary changes for supplying the entire system with power from the Leicester power station. A resolution that the stockholders vote to have the directors of the company confer with the proper officials of the Consolidated Street Railway Company, with a view of consolidating the two roads was adopted.

Street Railway Finances.—Street railways are not a private business, but a public service. They should not be allowed to issue any stocks or bonds against the estimated value of their public franchises, nor should they be allowed to issue any securities in any form except as represented by actual paid-in capital. Upon this capital they should be allowed to earn a prescribed dividend, and all earnings in excess of the dividend should be shared with the public treasury. There is no conceivable reason why in return for the performance of so simple a public service as transit in the streets, the community should be obliged to pay interest upon $10,000,000 or $20,000,000 for every $1,000,000 that has actually been invested by the company. Almost nowhere else except in the United States is this speculative stock jobbery permitted in connection with a municipal service like that of street railways or gas supply.—*Review of Reviews.*

Cincinnati, Newport and Covington Railway Company has just issued its annual report. The gross receipt of the entire system for the year were $497,692.49 as against $403,358.80 in 1893, a gain of $95,667.94, or 23½ per cent. In two years the earnings of the system have increased from $305,744.44 in 1892 to $497,692.49 in 1894. The average gross daily receipts in 1892 were $835.37; in 1893, $1,105.03; in 1894, $1,363.44. The average daily gain in gross earnings of 1894 over 1893 were $258.41. The statement of net results for 1894 shows that the expense per car mile, including tolls, was 18.56 cents, without tolls, 14.11 cents. The ratio of expense of operation to gross earnings, including tolls, was 73.53; excluding tolls, 55.88 per cent. The average receipts per car per day were $27.23. The receipts of the several lines for 1894 were: Madison avenue line, $90.914.75; Milldale, $51,235.35; Austenburg, $23,889.40; Main street, $62,633.25; West Covington and Ludlow, $9,997.94.

Lake Street Elevated, Chicago, Reorganization.—The plan for the reorganization of the Lake Street Elevated Railroad Company has been accepted by a full majority of the bondholders. This means that the holders of something over $4,000,000 of the bonds have agreed to a scaling down of their securities to 60 per cent. and to take 15 per cent. of the par value of their present holdings in income bonds. The first mortgage bonds will be guaranteed by the Northwestern Elevated Company, and the friends of the plan are confident that they will sell at par at least by reason of that. This would make them worth about eight points above their present market value. As for the income bonds, it is not likely that anything will be realized on them for the next year or two, but Mr. Louderbach, president of the company, states that any lease that is made with the Northwestern Elevated will certainly provide for sufficient rental to cover not only the scaled bonds but the incomes also. Most of the leading bondholders seem to be of the opinion that, all things considered, they will fare better under the present arrangement than they would were they to foreclose and attempt to operate the road themselves. Those of the bondholders who have not yet signed will be given until April 1 to come in. There is not likely to be anything in the nature of an attempt to force any of the objecting ones to terms either before or after that date, but those who do not sign will simply have to take chances on getting the interest on their holdings, as it is only the scaled bonds that will be guaranteed.

NEW INCORPORATIONS.

Parkersburg, W. Va.—The Parkersburg Traction Company has been incorporated with a capital stock of $200,000. The promoters are D. B. Judd, Wm. R. Burd, Wm. C. Spring, Bristol, Conn.

St. Louis, Mo.—The King's Highway Railroad Company has been incorporated with a capital stock of $20,000. The promotors are Fostus J. Wade, John C. Kenny, George W. Wilson, of St. Louis, Mo.

St. Louis, Mo.—The Pine Street, Kirkwood & Northwestern Railroad Company has been incorporated with a capital stock of $5,000. The promoters are Aug. H. Eilers. Jas. F. Brady, Jeremiah Ryan, St. Louis, Mo.

Waxahachie, Tex.—The Lake Park Street Railroad Company has been incorporated with a capital stock of $10,000. The promoters are Wm. F. Lewis. R. Vickery, J. F. Strickland, S. P. Langsford, V. H. Shelton.

Austin, Tex.—The Austin Dam and Suburban Railway Company has been incorporated. The capital stock is $100,000, and the promoters are Frank Hamilton, Jno. H. Chiles, Carl F. Drake, Harry M. Metzger. Austin, Tex.

Bucyrus, O.—The Inland Electric Railway Company has been incorporated with a capital stock of $50,000. The company proposes to build a street railroad between Bucyrus and Annapolis. O. The promoters are M. J. Monnett, Bucyrus, O.; A. J. Scott, B. Beal.

Turner's Falls, Mass.—A company has been organized here to build an electric road from Turner's Falls to Lake Pleasant and Miller's Falls, a distance of five miles, at a cost estimated at $80,000. The capital stock of $40,000 is pledged. Work will be commenced as soon as a franchise is granted, and a large power house will also be erected at Miller's Falls.

NEWS OF THE WEEK.

New Orleans, La.—The members of the street railway union have voted not to strike at the present time.

Waterbury, Vt.—At a special town meeting the town of Stowe voted to appropriate $40,000 to assist in building an electric road to Waterbury.

Concord, N. H.—The House Committee on Railroads has reported it inexpedient to legislate on various electric street railway bills, and the recommendations were adopted without division.

Hempstead, L. I.—The Highway Commissioners of Hempstead have granted the Long Island Electric Railroad Company permission to construct a trolley road on certain highways in the town.

Port Jefferson, L. I.—A trolley line is to be built across Long Island, from Port Jefferson to Patchogue, a distance of 15 miles. It is to cost $150,000, and will be used to convey freight as well as passengers.

Mt. Vernon, N. Y.—The North Mount Vernon Railway Company has decided to extend its lines to New Rochelle, Tuckahoe and White Plains. The company will begin active work as soon as the weather will permit.

New York, N. Y.—The Rapid Transit Railroad Commission held an open meeting Tuesday, to listen to protests and suggestions regarding the routes and plans of construction which were adopted two weeks ago.

Halifax, N. S.—In the Legislature on March 20, the City Electric Transit Companies' bill was thrown out and the Electric Tramway Company's bill, in which Boston capitalists are interested, was passed with amendments.

Boston, Mass.—At a recent meeting of the street railway committee of the Massachusetts Legislature, E. Moody Boynton was the petitioner for charters for four elevated electric railroads to be constructed on the bicyle railway system.

Baltimore, Md.—The County Commissioners have signed an order granting the Baltimore, Middle River and Sparrow's Point Railroad the power to lay a double-track electric road along the streets and roads named in the application.

Waukesha, Wis.—The Beach Electric Railway Company has awarded the contract for the erection of a 90-foot bridge across Fox River, to the Milwaukee Bridge & Iron Company of Milwaukee. The bridge will consist of two 45-foot spans of plate girders; will be 13 feet wide.

Philadelphia, Pa.—Charles McCaul, the contractor, has begun work on the car depot for the Electric Traction Company, at Jasper and Sergeant streets and Kensington avenue. The building will be one story high, of brick, 397 × 245 feet, and will cost $150,000. It will be used for the storage of cars and as a repair shop.

Chicago, Ill.—A passenger train on the Northern Pacific Road crashed into a west-bound electric car on Thirty-fifth street last week and completely demolished it. No passengers were on the street car at the time, but the motorman who jumped to save his life, dislocated his shoulder and was removed to the hospital.

Chester, Pa.—The Chester Traction Company has been served with an injunction by the Chester Electric Light Company. The order of court requires the traction company to give bonds to assume all damages that might result from the erection of its trolley wires in a manner to interfere with the electric light wires.

Geneva, N. Y.—Thomas Craig and others have purchased the Geneva & Waterloo Electric Railway, and will operate it in connection with the Seneca Falls & Waterloo Railway and with the Cayuga Park road, making a continuous line between Geneva, Cayuga and Cayuga Lake. It will be known as the Geneva & Cayuga Lake Traction Company.

Brooklyn, N. Y.—Edward Chapman recently sued the Atlantic Avenue Railroad Company of Brooklyn for $25,000 damages for injuries received by being run over by one of the defendant's trolley cars on Bergen street. He was thrown from his truck in a collision with the car and his leg was fractured. An incurable malady resulted from the injury. The jury gave Chapman a verdict of $10,000.

Mt. Holly, N. J.—A proposition has been made by a representative of the Pennsylvania Railroad Company to lease the road of the Mt. Holly Street Railway Company, with the idea of making it a part of the proposed trolley line from Burlington to Mt. Holly, the lessee to pay regular dividends of five per cent. on the stock of the street railway. The stockholders of the latter are strongly in favor of the plan.

Detroit, Mich.—A mortgage for $300,000 has been given by the Rapid Railway Company, of Detroit, to the Finance Company, of Pennsylvania, as trustees, to secure first mortgage bonds of that amount, to be guaranteed by the Finance Company. The railway company is about to build an electric road from Detroit to Mount Clemens, a distance of 21 miles. It is expected to be completed by July 1.

Paterson, N. J.—John Powers, formerly a motorman of the Paterson Railway Company, has brought suit against the company for $10,000 damages. He was severely injured in a collision early one morning last September. There was a heavy fog hanging over the low ground at Clifton, making it impossible to see more than a few feet ahead. Powers was in charge of a car which collided with another car.

Detroit, Mich.—Stern & Silverman, of Philadelphia, have been given the contract for the building of the roadbed for the Rapid Railway Company's line between Detroit and Mt. Clemens, Mich. The same firm also secured the contract for the erection of the power station and car-barn and the furnishing of the necessary steam and electrical plant, as well as the equipping of the line complete with cars, motors, trucks and overhead work.

Mt. Pleasant, Pa.—Hon. John R. Byrne states that work on the proposed new electric railway between Broadford and Mt. Pleasant, will commence about April 1 and be pushed as rapidly as possible. The road will be 15 miles in length and will furnish rapid transit facilities to a population of nearly 75,000. The company has had a charter since 1891. Rights of way have all been secured, and the prospects appear bright for the new line.

Philadelphia, Pa.—A sub-committee of Councils' Committee on Police and Prisons has favorably reported to the Council a bill regulating the speed of trolley cars within the territory bounded by Erie avenue on the north and Snyder avenue on the south and the two rivers, so that the speed may not exceed nine miles an hour. A fine of $10 is provided for each violation of the ordinance, and the law is to apply between 6 o'clock in the morning and midnight.

Boston, Mass.—A location will be asked for over the Commonwealth Avenue Boulevard by a new company, in which a number of West Newton capitalists, including H. B. Day, Frederic R. Cutter, Charles I. Travelli, George H. Ellis and George R. Blaney are interested. The company will be capitalized for $45,000, and it is proposed to build a double track line over the new boulevard from Auburndale to a junction with the West End tracks at the reservoir.

Aurora, Ill.—It is announced that a plan is under way to consolidate the Elgin and Aurora city railway companies to the extent of building an electric line between Carpentersville and Aurora. The companies would meet at Geneva, where a power plant would be operated in connection with one at each of the other cities. The companies could use a right of way secured previous to the panic, and as a passenger and freight road it is believed the enterprise would pay from the start.

Allentown, Pa.—The ordinance granting the Allentown and Reading Electric Railway Company the right to lay tracks in Allentown, vetoed by Mayor Allison, has been passed over his head by Councils. A number of Philadelphia capitalists are largely interested in the new electric road, which is to run from this city to Reading, paralleling the greater part of the Eastern Division of the Reading Railroad and passing through numerous thriving towns and a populous country district.

Harrisburg, Pa.—The bill permitting street passenger railway companies to enter into contracts with traction or motor power companies, which contracts may provide for the lease, for the sale and for the application of all or of any part of their property and franchises, and for the construction of necessary cables, motors, apparatus and appliances to be paid for by mortgage, bonds and otherwise, has passed the Senate. When the bill came up in the House it was recommitted to the Committee on City Passenger Railways.

Brooklyn, N. Y.—After a thorough test, the Brooklyn Elevated Railroad Company has decided to fill the places of the 25 or 30 women who have been night ticket agents, with men. The most competent of the women will be retained as day agents. President Uhlman, in discussing this change, said that it was in no way a reflection upon the manner in which the women have performed their duty, but that persons of rowdyish or hilarious turn were likely to come along late at night, and sometimes they had made it very unpleasant for the women agents.

Newark, N. J.—The South Orange Township Committee has granted, after several months' discussion, a franchise for a trolley road on Springfield avenue to the New York & Philadelphia Traction Company, thus virtually completing the last connecting link of the surveyed route for a trolley road between New York and Philadelphia. The franchise was made perpetual, the tax to be fixed by arbitration at the end of 50 years, and every 25 years thereafter. The annual license tax was made payable yearly after 1910, and to be fixed by arbitration every 25 years thereafter.

Harrisburg, Pa.—A bill that Representative Harvey, of Luzerne, has urged vigorously is an act to authorize street railway companies and traction motor companies or lessees of any street railway company to carry freight and to charge and collect compensation therefor. The friends of the Pennsylvania Railroad Company made an effort to kill the bill, but the solid support of the rural members and representatives from small cities pulled it through. The necessity for freight carrying electric railroads in many sections of the State was shown to be very great, and there was no hope for relief from steam roads.

Albany, N. Y.—The Cities Committee of the Assembly and the Railroads Committee of the Senate gave a hearing last week on the Conkling bill, submitting to the people of New York, Brooklyn and Buffalo, the question of municipal ownership of surface railroads. E. H. Crosby, of the Social Reform Club, of New York, David G. Archibald, of New York, Samuel Gompers. of the Federation of Labor, Alderman Joseph Clark, of Brooklyn, Robert Baker, of the same city, and Henry White, as the representative of the United Garment Workers of New York, favored the bill. The committee decided to report the bill favorably.

Detroit, Mich.—The Detroit Citizens' Street Railway Company has purchased property for the location of its power house. It has a frontage of 272 feet on Atwater street, just west of Riopelle, and extends back 200 feet to the railroad track. There is also involved in the deal 65 feet directly across Atwater street, and extending to the river, a distance of 500 feet. This will be used for a lock and for an intake and exhaust pipe connected with the power house. The property was purchased for $64,000. The company will erect on the larger site a fire-proof power house, of steel and brick. General Manager du Pont states that he is determined to have power supplied from this plant within three months. All the machinery, dynamos, etc., have been ordered, and will be delivered by the time the building is completed.

Boston, Mass.—Bids for the construction of section one of the subway, which is 1,500 feet in length, were opened last Wednesday. Following is a list of the bids which the subway commission assert are below the estimates of the engineer: J. W. Hoffman & Company, Philadelphia, Pa., $181,206; John McNamee, Brooklyn, N. Y., $138,484; Weaving, Booth & Company, Boston, $182,135; Jones & Meehan, Jamaica Plain, Mass., $ 39,602; Washburn & Washburn, Westchester County, N. Y., $189,787; F. C. O'Reilly & Company, New York, $1-3.057; McCarthy Bros. & Company, Franklin. Mass., $191,910; H. P. Nawn, Boston, Mass., $212 602; R. A. Malone, Boston, Mass., $146,604; Emerson & Liddle, Providence, R. I., $230,765; Crawford & Company, Brooklyn, N. Y., $173,423; Woodbury & Leighton. Boston, $231,625.

Chester, Pa.—The fight between the Philadelphia, Wilmington & Baltimore Railroad Company and the Chester Traction Company over grade crossings is at a standstill for the present, a stay of proceedings having been secured for the former company. Mr. Hanum appeared before Judge Sterrett, of the Supreme Court, who granted a stay of proceedings until March 3 next, when the case will be argued. The Philadelphia, Wilmington & Baltimore claim that, owing to an existing grade crossing 300 yards above Welsh street, it is not necessary for the traction people to cross Welsh street, which is at the throat of the freight yard. This is a victory for the steam road, and when argument in the case comes up the Philadelphia, Wilmington and Baltimore will vigorously contest the crossing of their tracks at Welsh street.

Asbury Park, N. J.—President Shaffer of the Seashore Electric Railway in Asbury Park has awarded the contract for the construction of the proposed electric railway from Asbury Park to Pleasure Bay. Work will be begun in a few days, and it is expected that the line will be in running order by the opening of the summer season. The road will run along the shore, passing through West End, Elberon and Long Branch. A few weeks ago Mr. Shaffer purchased the horse-car line, running from West End to Pleasure Bay, and the new road will follow a part of that route. The road will be run through Seaview avenue instead of Broadway, in Long Branch. The enterprise experienced much opposition in securing the right of way through Elberon, as many of the cottage owners signed a petition to the Ocean Township Committee asking that the franchise be refused. Mr. Shaffer has now succeeded in overcoming these objections, and the road is assured.

PERSONALS.

Mr. H. C. Thom, president of the Northwestern Electrical Association, died at his home in Madison Wis., March 16.

Mr. John R. Sterling has resigned the position of secretary of the Detroit Citizens' Street Railway Company, and is succeeded by Mr. Albert E, Peters.

Mr. George W. Pack, of Cleveland, has been elected director and president of the Detroit Railway Company to succeed the late Mr. Greene B. Pack.

General E. S. Greeley, of New York, has recently presented a fine collection of electrical apparatus to the Boardman Manual Training School of New Haven, Conn.

Mr. W. E. Davis, who recently resigned his position with the Toronto Street Railway Company, to accept the position of superintendent of consutrction for the Detroit Railway Company, was recently presented a handsome gold watch by the employees of the former company.

TRADE NOTES.

The Electrical Installation Company, of Chicago, has just moved its offices to suite A, Monadnock Building, where the company will have largely increased facilities.

The Mather Electric Company, of Manchester, Conn., has secured through J. Holt Gates, of Chicago, its Western contractor, the order for five 100-kilowatt multipolar generators, with station equipment for the new station of the Indiana Electric Railway Company, at Goshen, Ind.

The Berlin Iron Bridge Company, of East Berlin, Conn., has lately completed for the town of Barrington, R. I., an iron bridge 350 feet long and 20 feet wide. The Bonta Plate Glass Company, of Scranton, Pa,, has placed the contract for its new building with the Berlin Iron Bridge Company. The building will be 140 feet wide and 1,144 feet long, covered with the Berlin Iron Bridge Company's patent anti-condensation corrugated iron roof covering.

RECORD OF STREET RAILWAY PATENTS.

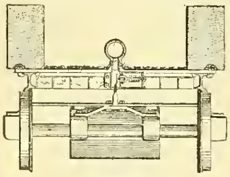
U. S. Patents Issued March 12, 1895.

535,345. Closed-Conduit Electric Railway; Edward M. Bentley, Boston, Mass Original application filed Dec, 11. 1885, Serial No. 185,411. Divided and this application filed Feb. 25, 1891. This is combination with a flexible conduit cover, of actuating devices for moving the cover so as to clear the slot connected to a vehicle, and movable transversely to the vehicle.

535,352. Motor-Truck;, John A. Brill, Philadelphia, Pa. Filed Jan. 3, 1894. The axle box frame has side bars, yokes and extensions from the yokes, apertured pedestals carried by the yokes, plates or cradles carried by the side bars and extensions beneath the pedestals and having recesses to receive the ends of bearing posts, arms extending downwardly from the plates or cradles and straddling the side bars and extensions, and pins passing through the arms and beneath the side bars and extensions.

535,363. Electric Heating Apparatus; Mark W. Dewey, Syracuse, N. Y., Assignor to the Dewey Electric Heating Company, same place. Filed. March 12, 1894. The heater comprises a plate or support, a resistance conductor wound thereon, an inclosing case provided with exterior fastening devices and with interior shoulders curving over the top and bottom and adapted to support the heater centrally, with a surrounding air space. The case is perforated to allow free circulation of air, and is open at the back to permit the heater being secured in close proximity to a wall or other support, with means for securing the heater to the case.

535,388. Fender for Street-Railway Cars; George H. Modemann, New York, N. Y. Filed Dec. 14, 1893. The fender is adapted to collapse beneath the weight of a body and so to form a seat or repository therefor. The fender is provided with wings at either side, which are extended by the collapse of the fender to a horizontal or vertical position respectively.



No. 535,398.

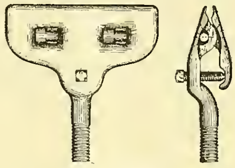
535,398. Conduit Electric Railway; Daniel O'Flaherty, Kansas City, Mo., assignor to Ella A. O'Flaherty, same place. Filed March 31, 1894. The slotted conduit has openings in one side, and insulation rings fitting in the openings. Casings or boxes have their open ends fitting externally against one side of the slotted conduit and surrounding the openings therein, and having oppositely disposed openings in their sides. An auxiliary conduit impervious to air and water comprises pipes connected by unions, and extends through the openings of the casings or boxes, and has apertures in its inner side within the casings or boxes, and opposite the openings of the slotted conduit. A cable is located in and insulated from the auxiliary conduit, and is exposed at points within the casings and opposite the openings of the slotted conduit. Insulation blocks fit within the casings or boxes, and are proved with a longitudinal passage. A spring-actuated contact-rod fits therein and projects into the slotted conduit, and an anti-friction roller is carried thereby. (See illustration.)

535,435. Switch-Operating Device; Jacob C. Woolverton, Brooklyn, N. Y. Filed Oct. 11, 1893. The mechanism consists of a frame suspended from a car, a shoe secured to the frame and provided with depending sides, while a brush is secured in one of said sides and a scraping bar or plate is secured to the rear of the shoe.

535,436. Life-Guard for Cars; Albert E. Wyatt, Jersey City, N. J. Filed Dec. 17, 1891. A swinging cradle is adapted to be swung by the weight of the body and a swinging apron is adapted to be swung by the impingement of the body thereon. The apron is provided with arms engaging with the supports of the cradle, whereby the movement of the apron will be utilized to assist in swinging the cradle. A swinging scoop is adapted to guide and conduct the body into the cradle, and means are provided for locking the parts in the position into which they are swung.

535,479. Sanding Device for Street Cars; Frederick F. Baumann and Jacob Weinz, Boston, Mass.; said Baumann assignor of one-half of his right to Louis Weis and Julius Weis, same place. Filed Jan. 5, 1891. The hopper has a delivery pipe, and an edgewise movable valve controls the same. An agitating device is attached at its upper end to and within the hopper, and has its lower end loosely connected to the valve whereby the lower end is moved by and with said valve to to loosen the sand.

535,511. Electrical Controller; Elmer A. Sperry, Cleveland, O., assigner to the Sperry Electric Railway Company, of Ohio. Filed Nov. 11, 1893. Claim 6 reads as follows: "In an electric controller, a two-way switch, a supply circuit connection for such switch, a local circuit connection for such switch, a main moving element of the controller, an electric motor connected with such controller having fields and armature, a reversing switch for either field or armature located within such controller in combination with mechanism, whereby the two-way switch and reversing switch are simultaneously operated from the movement of the said moving element, and means for reversing the relative movement of the said two-way and reversing switches."

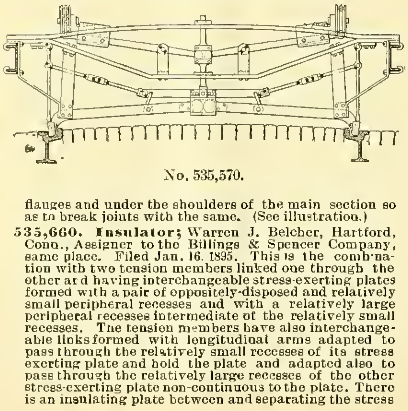


No. 535,524.

535,524. Clamp for Trolley-wires; Warren W. Annable, Grand Rapids, Mich., assignor of one-half to the Butterworth & Lowe, of Michigan. Filed Nov. 23, 1894. The jaws have opposing concave ends to engage opposite sides of the conductor with means for adjustably hinging the jaws to each other, consisting of loops on one of the jaws having a portion of their concave sides flattened, and studs on the other of the jaws having laterally projecting pintles engaging the flattened portions. (See illustration.)

535,570. Rail-Brake for Cars; Henry E. Boyd, McKeesport, Pa. Filed Oct. 16, 1893. Brake-bars cause brakeshoes to press against the sides of the rails and a vertically moving head operates the bars. There is a loose connection between the head and the brake-bars, whereby after the shoes are relieved of pressure they are raised from the track. (See illustration.)

535,608. Tramway-Rail; William H. Wright, Buffalo, N. Y. Filed Dec. 26, 1894. A continuous rail, consisting of the main section, provided on its under side with the webs or flanges and shoulders, and the side-supporting sections provided with the vertical portions, and the outwardly inclined or diagonal portions. The vertical portions are bolted against the webs or flanges and under the shoulders of the main section so as to break joints with the same. (See illustration.)



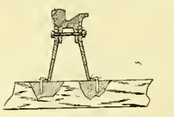
No. 535,570.

535,660. Insulator; Warren J. Belcher, Hartford, Conn., Assigner to the Billings & Spencer Company, same place. Filed Jan. 16, 1895. This is the combination with two tension members linked one through the other and having interchangeable stress-exerting plates formed with a pair of oppositely-disposed and relatively small peripheral recesses and with a relatively large peripheral recesses intermediate of the relatively small recesses. The tension members have also interchangeable links formed with longitudinal arms adapted to pass through the relatively small recesses of its stress exerting plate and hold the plate and adapted also to pass through the relatively large recesses of the other stress-exerting plate non-continuous to the plate. There is an insulating plate between and separating the stress exerting plates in longitudinal direction and having relatively small peripheral recesses registering with the recesses of the stress-exerting plates. It is adapted to receive the longitudinal arms of the tension members and to hold the tension members against rotative movement relatively to the insulating plate.

535,688. Car-Fender; Herbert B. Ewbank, Jr., Baltimore, Md., Assignor of one-half to Herbert Bryan Ewbank, same place. Filed Jan. 4, 1895. The fender frame has an elevated top-bar extending crosswise in front of the car; flanged wheels supports the front of the fender frame; a "fifth wheel" or frame is swiveled to the bottom of the car; a jointed connection unites the fender frame and "fifth wheel" or swiveled frame; and there is a spring between the car-front and the center of the crosswise top bar of the fender—the spring pressing forward on the cross-bar.

535,733. Car-Fender; Louis L. Seaman, New York, N. Y., Assignor to the Darrach Car Fender Company, Newark, N. J. Filed Jan. 3, 1895. A hanger is suspended from a car-body, and a pendent hook pivoted to the hanger and having an upwardly-projecting tail-piece, a pendent, pivoted net, a link pivotally connecting the net with the upwardly projecting tail-piece of the pivoted hook, a scoop pivoted at its rear end to a part of the car-body and adapted to engage the hook. A vertically movable treadle acts directly upon the net for swinging the latter inwardly to operate the hook and thereby release the scoop.

535,734. Motor for Street Cars; Joel C. Slaughter, Dallas, Tex. Filed June 21, 1894. Claim 8 reads as follows: "In a car motor, the combination of the oil cylinder; steam generators; burners connected by means of pipes with the oil cylinder and located under the steam generators; a shield plate which is movable and adapted to be interposed between the said burners and the steam generators, so as to cut off the flame from the latter; a water-reservoir; a water-feed device having communication with the reservoir and the steam generators; an engine supplied with steam from said generators; and a governor connected with the engine, the movable shield plate and the water-feed device, whereby, when the speed of the engine increases beyond a certain point, the governor will automatically shift the said shield plate and also cut off the supply of water through the feed-water device."



No. 535,608.

535,741. Car Fender; James C. Sneden, Philadelphia, Pa. Filed Jan. 12, 1895. The fender has rearwardly extending flanges from the side bars thereof. A supplemental fender is located at the rear thereof, mounted in suitable brackets, secured to the under side of the car, springs normally urge the rear fender downward. A latch bolt in the forward part of said car is engaged by a lever, and there are connections between the lower end of the lever and the rear fender whereby the latter is raised when the lever is in engagement with the latch bolt, and is lowered when the lever is thrown out of engagement with the latch bolt. A trigger and connections between said trigger and said latch bolt release the same, the said trigger being in engagement with the rearwardly extending flanges, and actuated thereby upon the upward movement of the forward fender.

535.763. Street-Car Fender. Stephen S. Kimball, Montreal, Canada. Filed Aug. 4, 1894 This is the combination with suitable standards at the end of the car, of a guard composed of a rectangular frame, with wire mesh filling, pivoted at its inner end to the standards. A shaft extends between the standards and movable supports in the form of rocker arms or levers rigidly mounted on the shaft, by which the guard is normally elevated. A trip or feeler is connected with the shaft to operate the supports and extending forward of the guard.

535,776. Car-Fender. Sanford H. Shaw, Philadelphia, Pa. Filed Oct. 26, 1894. The fender comprises a vertically movable spring frame, detachably secured to the car in manner to be normally supported clear of the roadbed, and provided at the outer end with wheels, which are adapted to ride upon the track when the frame is depressed. A track cleaning brush is rotatably mounted in the frame, and means are provided for driving the brush, and a catch net is attached to the frame and yieldingly connected with the car.

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We invite correspondence upon all subjects of interest to street railway men. Information regarding changes of officers, new equipment, extensions, etc., will be greatly appreciated for our news columns. Communications for the attention of the editor, new advertisements and changes should reach this office not later than Thursday morning of each week.

Address all communications and remittances, and make drafts, checks and money orders payable to

STREET RAILWAY GAZETTE COMPANY,

1208 Havemeyer Building, New York.

As the STREET RAILWAY GAZETTE is published 52 times a year, and is the only weekly publication devoted to Street Railway Interests, its value as an advertising medium will be apparent to Manufacturers and Dealers in Street Railway Apparatus and Supplies of every description. We will take pleasure in quoting rates for advertising space.

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Decision of Importance in Pennsylvania.

A decision of the greatest importance has just been made by the Supreme Court of Pennsylvania. It appears that there exists in that state no adequate legislation for the construction of electric railways outside of cities and towns. A vast number of suburban railway enterprises have been projected in Pennsylvania, but, according to this decision, there is no warrant for building the roads under the existing street railway act. It is shown by this decision that there is a radical difference between city streets and common highways in the country, and that even the consent of the township authorities does not warrant the occupation of the latter by electric railways. In order that the construction of the suburban electric railways now projected may be warranted in law, a general street railway act conferring upon the companies the necessary powers to obtain rights of way is needed. In order that electric railroad interests may not suffer and that rural travel may be developed, it would seem to be the part of wisdom for the Pennsylvania Street Railway Association to start to work to secure the enactment of the proper legislation.

New Speed Ordinance in Brooklyn.

Brooklyn has a brand new ordinance regulating the operation of electric railways, as the measure passed by the City Council a few weeks ago for this purpose has been vetoed by Mayor Schieren. According to the new regulations, the car speed must not exceed eight miles an hour; but if the companies adhere strictly to this rule, there will be, we believe, a vast deal of public dissatisfaction. There are districts in Brooklyn where a speed of certainly 12 or 15 miles an hour can be attained with perfect safety, and we question very much whether passengers, anxious to reach their offices or their homes, will be content to travel at a rate that is little faster than that of the old horse cars. It certainly will be found that eight miles an hour is not a speed to satisfy the popular idea of rapid transit. There is one good thing, however, about the new ordinance—passengers are prohibited from standing on the front platform. According to the ordinance that has just been vetoed, three passengers were allowed to remain there—a concession made in behalf of smokers, but one, we think, of very doubtful expediency. The presence of passengers on the front platform is certainly calculated to interfere with the motorman, and the limitation to three persons would be likely to lead to a dispute whenever a fourth person wished standing room in front. When strangers boarded the cars constant explanation would be necessary ; indeed, the complications that such a provision would introduce seem to us to afford reasons enough for the veto of the ordinance by Mayor Schieren.

Conflicts Between Steam and Trolley Railways.

The conflict between electric railways and steam railroads is developing many interesting features at the present time. The officials of the latter roads no longer disguise the fact that competition is seriously affecting their short-haul traffic, and two singularly different campaigns are now being waged against the new competitors. In Connecticut an appeal has been made to the legislature by the New York, New Haven & Hartford Railroad Company, which has the assurance to ask that body to refrain from granting all privileges to electric roads whose operation may tend to reduce the railroad's receipts. Last week we published an account of a hearing before the railroad committee, in which the cause of the steam roads was pleaded, and in this issue the speech of a representative of the electric railway interests is printed. The latter makes a strong case for the trolley lines, which give cheap, rapid and convenient service to the people of the State. It is pointed out that the Consolidated company is, to all intents and purposes, following a "dog in the manger" policy ; it does not give such local service as the people require, and is unwilling, apparently, that any other company should do so. The traffic which the steam roads have lost is, it is shown, purely incidental. In volume it would not begin to justify the construction of the cheapest electric railway that could be built. The position of the steam railroad company, therefore, is that ninety-nine persons shall be debarred from convenient, cheap and frequent service, lest the railroads should be deprived of the fare of the hundreth man who might wish to travel on the steam line. It was also asserted that the companies not only had no right to find fault with the existing electric railways, but were actually indebted to them, as it was demonstrated that during the three months for which the losses in traffic complained of had been computed in the business of the Consolidated company, the value of its stock had increased from $15 to $20 a share. Its general business had also increased during that time—a fact which would seem to indicate that the through travel on the line had been stimulated by the increased convenience of access to the stations on the road. Whatever may be the action of the legislature, it is safe to assert that the people of Connecticut will not brook any interference with the construction of electric roads at points where they are needed. While the building of trolley lines may be temporarily delayed by adverse legislative action, the ultimate linking of towns throughout Connecticut cannot be stopped. The second noticeable fight of steam roads against the trolley is being waged in Philadelphia, where the former are experiencing an extraordinary loss in suburban traffic. There is no chance in this case to appeal for assistance to the law-making powers to ward off competition, and the railroad officials see no other way than to fight the trolley lines on their own ground, that is, to give so good a service, at such reasonable rates, that the patronage of the public may be retained, or regained if it has been lost. It is announced that the Reading road proposes to engage in the fiercest sort of competition with the electric railways, and with this end in view it is arranging, for example, 15-minute trains to be operated between the Reading Terminal and Germantown. It is also stated that the Pennsylvania Railroad will vastly improve its suburban service in the hope that its local traffic may not be lost. On the Reading, the fares for the suburban service are to be materially reduced; in some cases 5 cents will be charged, where the rate has heretofore been just double ; in other cases, the rate will be 7 cents instead of 12, and in one instance, by the purchase of commutation tickets, a person can secure transportation for 10 cents that formerly cost him 25. This is the kind of competition with which no one can find fault, and every one will watch the progress of the fight with the greatest interest. We cannot but believe, however, that the time is not far distant when the competition between the two interests will not involve a conflict between two kinds of motive power. The day is probably near at hand when electricity will be adopted on all suburban lines. When that takes place the fight will probably be no less bitter, and it will be even the more interesting, for the railroad company will have a much better chance for success than under existing circumstances.

NOT GUILTY OF VIOLATING THE TEN-HOUR LAW.

Benjamin Norton, President of the Atlantic Avenue Railroad Company of Brooklyn, and Daniel J. Quinn, Superintendent of the same company, have been acquitted by a jury of the charge of violating the provisions of the ten-hour law. According to the law, surface street railway companies in cities of the first class are prohibited from exacting from their employees more than 10 hours' labor in 12 consecutive hours.

The indictment of Mr. Norton and Mr. Quinn on the charge of violating this law was an outcome of the recent strike, and was brought about by complaints of former employees. Until the strike caused the former employees to devise all possible means of attacking the companies, no complaint of a violation of the ten-hour law had ever been heard. The specific charge was that on Jan. 12, 1895, President Norton and Superintendent Quinn compelled Jeremiah Desmond a conductor employed on the Fifth Avenue line, to work eleven hours and nine minutes in twelve consecutive hours.

The trial was conducted before Judge Moore in Brooklyn. Benjamin Frick, secretary and treasurer of the Atlantic Avenue Railroad, the first witness, identified the time-table under which Desmond was working. The prosecution got a setback before the trial had been under way half an hour, as it wanted to introduce the rules and bylaws of the company to show that the men were required by it to work more than ten hours.

"If that book is introduced as evidence," said Judge Moore, "I shall have to direct the jury to bring in a verdict for the defendants. If the men went into the employ of the company knowing that they would be required to work more than ten hours in twelve, their doing so was voluntary, and not the result of exaction by the company. Men can make whatever terms with employers they wish."

Desmond, complaining witness, was put on the stand and questioned at length by Judge Moore as to the length of time he was actually engaged on the nine trips he made per day. Witness acknowledged that these trips consumed only 540 minutes or nine hours. In answer to a question by Judge Moore, witness said that the other two hours and nine minutes were consumed at the stands, where he was not allowed to leave the car. Desmond declared that if he did not start his car according to the time-table he would be sent before the superintendent, by whom he would be suspended.

The prosecution developed few other facts of any interest; indeed, the case was peculiar, in that the facts were almost entirely undisputed. At the close of the prosecution, the counsel for Mr. Norton and Mr. Quinn moved that the court discharge the defendants on the ground that the evidence was insufficient, and that the ten-hour law was unconstitutional. These motions were denied.

President Norton then testified that the men had always appeared satisfied with the time-tables until the strike occurred. No one had ever made any complaint to him that he was obliged to work in violation of the ten-hour law. If any such protests had been made he would have investigated them. The working time according to the agreement was ten hours within twelve consecutive hours, exclusive of time for meals and rest. The men had all agreed to this of their own free will.

Superintendent Quinn gave similar testimony, and several employees of the road testified that they heard nothing of the alleged ten-hour law violation until the strike occurred.

In his charge to the jury, Judge Moore said:

These men are either guilty or not guilty. They are indicted under the law passed in 1887. In the first place, this law does not prohibit any man's making a contract to work more than 10 hours a day if he pleases. If it did I should have no hesitation in saying that such a law was beyond the power of the Legislature to pass. We have a right to make a contract, and no law can take it away. It occurs to me that the "stand time" was part of the working hours. Desmond did work, this time included, more than 10 hours, but was there any exaction? If that working time was agreed to voluntarily by word of mouth or by long concurrence without objection, the continuance of it on Jan. 12 would not be an exaction.

"It appears from the testimony that Desmond had been in the employment of the company for 10 years. It had been the custom to regard the 'stand time' as not a part of the working time. The defendants had a right to make that agreement. They had a right to say that the working hours should be those in which the cars were actually moving. Was there such an agreement? That you must decide from the evidence, which is that Desmond had been acting with that understanding for years. There is no evidence that he ever made any complaint. He continued to so act until the strike. It is also in evidence that this was the custom of all the employees. If that was the construction put on the agreement by employers and employees, then his working 11 hours and more on Jan. 12 was not an exaction."

Judge Moore went on to say that while the agreement between employers and men for the year 1895 was unsigned the old agreement of 1894 was in operation, and he added in conclusion:

"If by a long period of acquiescence, by a long concurrence, these men and the company construed the contract to mean that the working hours should be while the cars are in motion, it was not an exaction that Desmond worked more than 11 hours on Jan. 12. I will say that the law is very loosely drawn. The purpose of the maker was to benefit a certain class, but he did not succeed. With a little more attention it could have had its intent fixed beyond a doubt. It should have said that in no instance should the companies require of the men more than 10 hours' work, and that 'stand time' and 'meal time' should not be included."

The jury after a short period of deliberation returned a verdict of not guilty—a result which had been regarded as a foregone conclusion.

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LICENSES FOR MOTORMEN AND GRIPMEN.

The Cities Committee of the Assembly gave a hearing on March 21 on the bill of Assemblyman Friday, of Brooklyn, providing that motormen and gripmen of Brooklyn and New York should be licensed. It is provided in the bill that no one shall operate a cable or electric car in the two cities named unless he holds a license for which he must pay 50 cents. The examining board which is to issue licenses consists of the boiler inspectors, who are empowered to employ an electrical expert, at a per diem salary of $10, with a further provision that he shall not be employed for more than 30 days in any one year, except in an emergency, when two additional men may be employed. Speeds were fixed at six and eight miles per hour.

Mr. Bissell, representing the associated street railways, opposed the bill. He objected first to the boiler inspectors as the examining power; their duties were to deal with steam, he urged, and not with electricity. How could they determine whether a man was competent without putting him through a practical examination such as the roads would give before employing him. It would be necessary for the city to build a mile of track, and establish a school to find out whether a man was competent or not. The bill would tie up the companies hard and fast, in the event of a strike, and that was the intention of the bill. He also spoke of the Massachusetts law, where the capacity of the man is tested by the company, and then upon the application of the company the license is issued. If the men are to be licensed, then when a jury says that an accident is due to the negligence of the men, the license should be forfeited and the delinquent should be debarred from getting another. In general he characterized the bill as loosely drawn and impracticable in its workings.

Henry A. Robinsou, representing the New York cable companies, described how gripmen are schooled and taught to run a car. In view of the method in use he thought that gripmen should be excluded from the provisions of the bill.

Assemblyman Friday spoke in advocacy of the measure, and denied that it was intended to affect strikes. No such intention entered the minds of the people who framed the bill. In the event of any trouble on a road from a strike, the examining board was empowered to employ extra assistance to issue licenses. The intent was, that a man should first obtain his license and then apply to the company for employment. The intent of the bill was to protect human life and prevent accidents. The speed regulations as to the outer districts were necessary, because it had been shown that all the accidents occurred in the outlying districts, where the cars are run at a high rate of speed to make up time. It had been shown that when a certain time was allowed for trips that a good proportion of it would be lost in downtown stoppages, and then the men had to run fast to keep within the schedule.

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STEAM AND ELECTRIC RAILWAY COMPETITION IN PHILADELPHIA.

Since the electric cars of Philadelphia have been carrying passengers at cheap fares to Germantown, Chestnut Hill and intermediate points, the Reading and Pennsylvania roads have lost a very considerable part of their suburban traffic. The loss in traffic, however, has not been confined solely to the suburban lines mentioned, but it has been very considerable on the lines running to Manayunk, Darby and suburban stations on the line of the Central Division of the Philadelphia, Wilmington & Baltimore Passenger Railroad. The Reading Railroad Company, however, has been the worst sufferer from the competition and it is therefore determined to make a great effort to recover its suburban traffic. It proposes to offer to the public rapid service at fares much cheaper than those that have heretofore prevailed. According to the new schedule that has been arranged by the Reading Company, 55 trains daily will run to and from Germantown and about 35 to and from Chestnut Hill. These will be run at intervals of from 15 to 30 minutes. In order to compete with the electric cars, which carry their passengers to convenient points in the city, the Reading Company proposes that all trains having Germantown as their terminus will be run into the old station at Germantown avenue and Price street, almost in the heart of the city. The trip between Market street and Germantown will be made in 17 minutes, while the running time to Chestnut Hill will be 27 minutes. The most important change, however, and the one in which the public will be most interested, is the reduction in fares. These will, in some cases, be cut in two; in fact, the reduction in the suburban fares will probably average about 40 per cent. The changes will not stop, however, with the Germantown and Chestnut Hill line; fast trains will be run to Manayunk, Jenkintown and intermediate places in those directions, and the service will be more frequent. The reduction in fares will also be very considerable. It is probable that if these sweeping changes introduced by the Reading road are successful, the Pennsylvania road will follow its example. While nothing is definitely known, it is stated that the officials of the Pennsylvania road are contemplating changes of an important kind.

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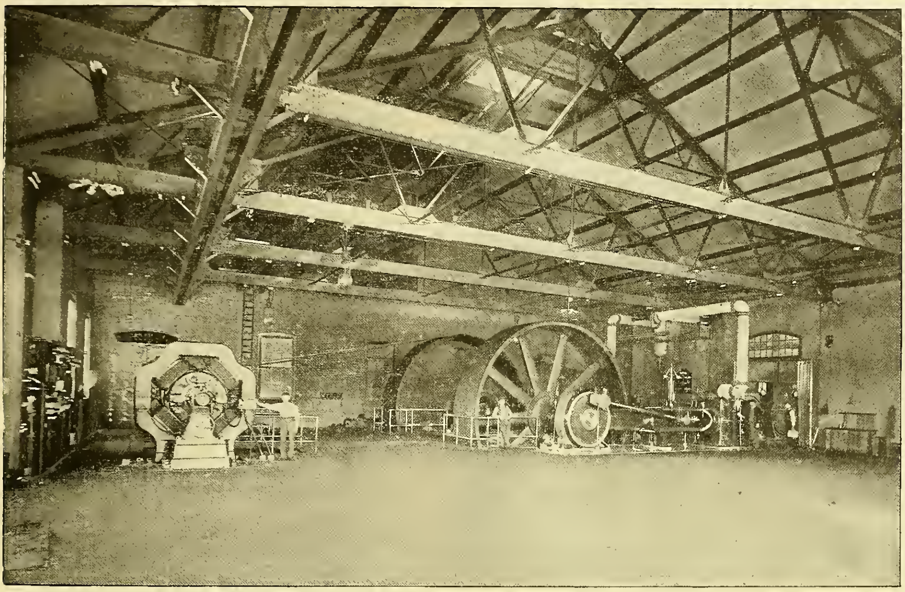
STREET RAILWAY MAIL SERVICE.

The Post Office Department has about concluded arrangements with the companies controlling Broadway and Third Avenue cable lines in New York city, by which they will hereafter carry the mails between the General Post Office and 20 regular postal stations and 30 sub-stations in the city. It is probable that, when the negotiations are ended, fully equipped postal cars will be operated on the two systems. It seems to be the opinion that in New York an entire car will be needed for carrying the mail, and not simply half a car, as is the case with the Brooklyn postal car now in operation. A dispatch from Washington states that the postal authorities there are extremely interested in the matter of establishing mail service on the street railway lines of all large cities, as they believe that the service can be materially improved if the wagons can be abandoned.

ELECTRIC RAILWAY POWER PLANT IN ALLENTOWN, PA.

The power plant illustrated in the accompanying cuts was built for the Industrial Improvement Company of Boston, in Allentown, Pa. It was designed for business men already experienced in street railway management, and was planned with the fullest consideration of first cost, economy of operation and reliability. There is no architectural ornamentation, no cabinet maker's work, no tile floors, not an endless amount of brass and nickel plate to give work to the "unemployed," but the plant has in it good material and machinery. There was incorporated, as far as practicable, every device and arrangement that would in the end prove a good investment, and the whole was constructed and equipped under constant and careful supervision.



INTERIOR OF ELECTRIC RAILWAY POWER STATION IN ALLENTOWN, PA.

ELECTRIC RAILWAY POWER STATION IN ALLENTOWN, PA.

The station is situated on the banks of the Lehigh canal, where there is always a sufficient supply of good water for both boilers and condensers. Coal is delivered by boat at the station, and its low cost had an important bearing upon the design of the plant, making many features advisable here that would be modified in places less favored.

The building is of brick with slate roof, and the construction is well shown by the illustrations. The engine-room floor is seven feet above the basement floor, giving ample room for the condensers, heaters, piping, belts, wiring, etc. The boiler-room floor is three feet above the basement floor. The roofs are supported by steel trusses which in the engine-room are of sufficient strength to bear a load of ten tons at any part of the room. Over the generators runs a traveling crane, capable of supporting any part of the machines, so that repairs may be made in the shortest possible time and with the least labor. Above the center of the engine-room is the wire tower, reached by a light stairway and run. It is of good size and the tangle of wires common in these places is done away with.

The completed station is to consist of four direct belted units, each of 500 kilowatts capacity, but at present two units only are installed. The generators were built by the General Electric Co. The switch-board is directly behind the generators, is made entirely of slate and iron, and may be increased in size as occasion requires by simply adding panels. Each section of the road has a distributing panel of its own, containing wattmeter, fuse, switch, ammeter and circuit breaker. Conductors nowhere in the station come in contact with anything but non-combustible material, and every part of the electrical apparatus and construction is in plain sight and accessible.

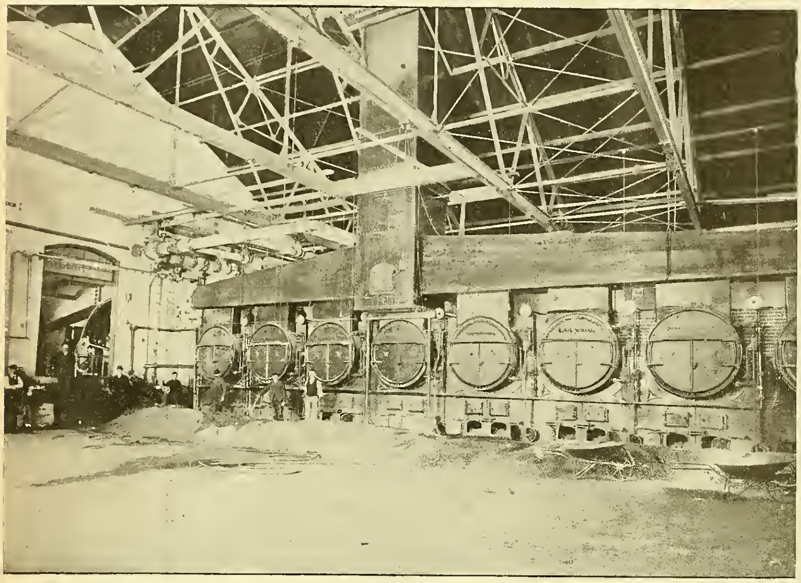
Simple condensing engines were decided upon, an estimation of all the elements of cost proving this type to be the most economical in this case. They are slow speed, have the Corliss valve gear, and are very heavy in all parts, and were built by C. & G. Cooper & Co., of Mount Vernon. The cylinders are 30 by 48 inches and the speed 72 revolutions per minute. It is intended that steam at about 100 lbs. pressure shall be ordinarily used, but all parts of the plant are designed to carry 125 lbs. when occasion makes it advisable. In the basement between the engines now installed are placed the condensers, and the floor above them is entirely open, so that their action at all times may be easily watched, and they are thus less likely to be neglected. A winding stairway leads directly to them from the engine-room above. The condensers, built by the Knowles Pump Works, are of the independent steam driven type, and either condenser may be used with either engine. Relief valves, in case of accident, allow the engines to run high pressure.

The boilers, which were made by the Phoenix Iron Works Co., are fed with either of two pumps, and the supply may be taken from the hot well, direct from the canal, or from the city mains. In any case the water may be passed through the feed-water heater or not. In case of accident the boilers may be fed temporarily through the water leg leading to the blow-off cocks, so that no one accident can prevent proper feeding. The feed-water heaters were furnished by the Wainwright Manufacturing Co., and the steam pumps by Henry R. Worthington.

The completed plant will have two rows of return tubular boilers (18 feet long and 72 inches in diameter), eight on each side of the boiler room. Each four boilers has a main running to the header, which extends along the wall back of the engines. Either of these mains may be cut off from the header, and any boiler may be cut off from its main, and the plant cannot be shut down on account of accident to the steam piping unless through some almost impossible combination of accidents. The fittings were all designed and cast for this plant, and are unusually heavy. All joints are made with a tongue and groove with copper gasket. Main steam valves are all fitted with bypass valves. All pipes are suspended from trusses by universal hangers and the piping is braced in such a way as to obviate vibration. In the main steam pipe system one point is slightly lower than any other, and a trap at this point removes all condensed water. The steam pipes are covered throughout and each engine is provided with a separator for assuring dry steam.

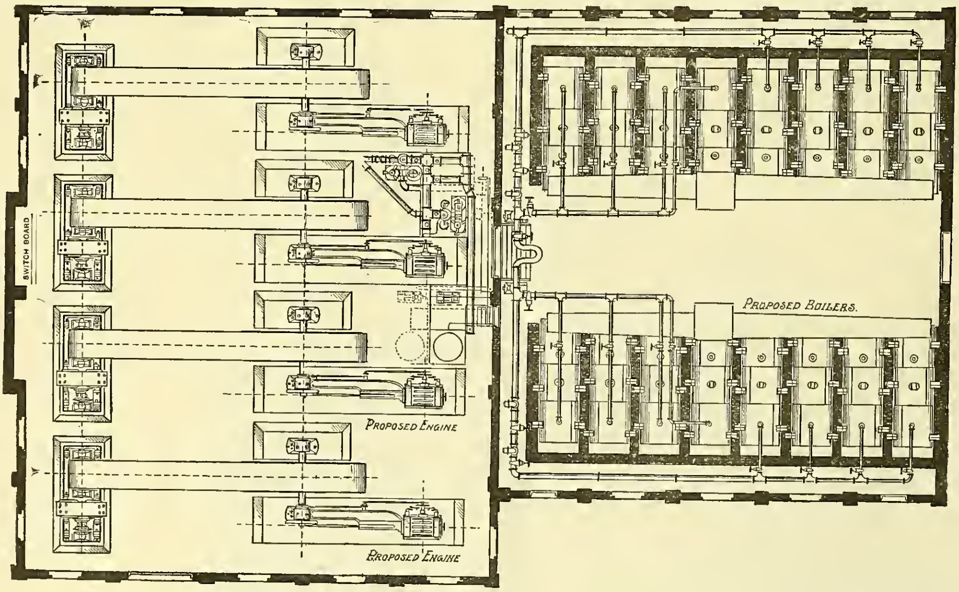
The very low price of coal made it advisable to use a forced draft when the load became heavy, and to erect a much lower and cheaper stack than would have been wise in most cases.

The building is well protected against fire; there are four lines of 2-inch hose, 50 feet long, connected in the engine room, two lines in the boiler room and one in the basement. These may be supplied from the city mains or from the pumps in the boiler room, and a gauge on the pipes leading to the hose shows at all times whether or not the pressure is there.



ELECTRIC RAILWAY POWER STATION IN ALLENTOWN, PA.—BOILER ROOM.

Another feature of this plant may be of interest. The company operating the street railway owns the lighting plant in Allentown. When the new railway station was started the lighting plant was removed to the abandoned railway station, which is situated directly in the rear of the present one. This old station was reconstructed for its new use, and arrangements made so that it would co-operate with the new plant to the best advantage. An extension of the steam header in the lighting plant was run to the new station, so that when the railway load was light steam could be used from the railway boiler plant for the lighting station and the lighting station boilers shut down entirely. The two stations are connected by short passageways, so that the labor of caring for both is reduced to a minimum. A large saving comes also from another quarter: there are in the lighting plant two 500 H. P. compound condensing engines, belted to a countershaft divided into three parts. The day load is small, amounting with both incandescent lamps and power to not more than 50 H. P. There would obviously be much expense in comparison to the income in running one of the large engines with the attached countershaft for this load. There are on the middle section of the countershaft, a small alternator, and two 100 H. P. generators for furnishing power or acting as a relay to the railway station. One of these generators was so connected that it could be used either as a generator or as a motor driven by the railway station generators. This makes it unnecessary to run the lighting station engines except at night, as with the small day load of 50 H. P., the motor does the work perfectly and requires no attention, while the extra load on the railway generators is so small as to be scarcely noticed. Moreover the load is added to the railway engines at a point of good efficiency, while the small load would have been a very uneconomical one for the lighting engines. It may be realized what a large saving in operation is effected by the combination of a railway and lighting station when it is stated that in this instance there are required for both stations only a fireman, dynamo man and oiler in addition to the force formerly necessary in the railway station alone.



PLAN OF THE ELECTRIC RAILWAY POWER STATION IN ALLENTOWN, PA.

The power plant was designed and installed under the supervision of Stone & Webster, Chicago and Boston.

RIGHTS OF PENNSYLVANIA SUBURBAN ELECTRIC RAILWAYS.

Judge Williams, of the Supreme Court of Pennsylvania, on Monday last handed down a decision of vast importance to a large number of street railway companies in this State. The case which is decided is that of the Pennsylvania & Schuylkill Valley Railroad Company against the Montgomery County Passenger Railroad Company. The facts in the case are presented in the subjoined abstract of the opinion. Judge Williams decides that the Pennsylvania law does not provide for the construction of suburban railways traversing country roads. The Street Railway Act, the Court finds, gives no right of eminent domain, and that, as the trolley companies are incorporated under that act, they have no power to construct their roads where the taking of property is incident or necessary to it without the consent of the owner of the property. The following abstract covers the essential parts of the opinion:

Our system of street passenger railways had its origin in the days of special legislation. Each company then had its own act of incorporation, in which its route was described and its powers defined. These companies were confined to the cities and large towns of the State, and their cars were moved by horse power, and were a substitute for the omnibus and other vehicles devoted to the carriage of passengers which had been previously in common use. After the adoption of the new Constitution the practice of separate legislation for each company became impracticable, and in 1878 a general law was passed providing for the organization of street railway companies for the purpose of "constructing, maintaining and operating a street railway for public use in the conveyance of passengers." No power of eminent domain was conferred on these companies, but the several provisions of the act show that such railways were to be constructed upon the streets, conforming to the grade of the streets and subject to the regulation of the municipal authorities. The act of 1876 gave to street railway companies in cities of the first class the right to "use other than animal power" in the movement of their cars. The act of May, 1878, conferred the like right upon street railway companies in cities of the second and third classes. The general law further provided that any company organized under its provisions should maintain an office for the transaction of its business in the city where its railway was located. All these provisions show that the street railways contemplated by the general act of 1878 were intended for the accommodation of the crowded streets of cities and for no other purpose. The present general law relating to these corporations was passed in 1889. It was intended to bring together the valuable provisions of several Acts of Assembly into one comprehensive statute, and to make some changes that experience had shown to be desirable. It authorized the incorporation of five or more persons for the purpose of "constructing, maintaining and operating a street railway on any street or highway upon which no track is laid or authorized to be laid under existing charters.

"From these provisions, we think it is apparent that the attempt now being made to convert these city conveyances into long lines of transportation connecting widely separated cities and towns, by electric railways traversing country roads, was not anticipated or provided for by the Legislature. The failure to confer upon these companies the power of eminent domain would, if it stood alone, be sufficient to justify this conclusion. The land taken for streets in cities and boroughs is in the exclusive possession of the municipality, which may use the footway as well as the cartway for any urban servitude without further compensation to the lot owners. Nor does the construction of a street passenger railway upon the surface of the street impose any additional servitude upon the property fronting on the street so occupied. But the easement acquired by the public by proceedings under the road laws is an easement for passage only. The owner is entitled to the possession of his land for all other purposes.

"The consent of township authorities justifies an entry upon the public road so far as the public in concerned, but the supervisors of the townships have no right to bind private property or subject it to a servitude for the benefit of any person or corporation other than the township and the public it represents. The carriage of passengers through the township, on their journey from one city or borough to another, by rail, is in no sense a township purpose; and whether these passengers make their journey in cars drawn by a locomotive over a steam railroad, or in those propelled by electricity over tracks laid upon the highways, is immaterial both to taxpayers and to landowners along the route traveled, except as the adoption of one or the other of these modes of transportation may affect the township roads or the private property of citizens. When the supervisors give their consent to the occupation of the township roads by a street railway, they speak as the representatives of those who build and those who own the roads, but not as the representatives of private property over which the roads pass. The street railway companies cannot reach the property owners either through 'the local authorities' or by the right of eminent domain as the law now stands; and it is not easy to see how such a company can protect itself in the use of country roads except by contract with every owner of property along the roads they wish to occupy.

"The trouble is that the supposed needs of the country have outgrown its legislation, and an effort is now being made to adapt street railways to purposes for which they were never intended, and for which the existing legislation relating to them was not framed.

"Cities and boroughs possess the necessary power over their streets to enable them to authorize their use by a street railway. Townships do not possess municipal powers, and under existing laws their control over the public road is limited."

The court then discussed the proper way for authority to be given by township officials and added:

"But we know as a matter of current history that street railways have been projected, and actually constructed, and are now in operation over country roads where no legal consent has been obtained and where no attention has been paid to the rights of the property holders. Such railways cannot now be torn up or enjoined, either by the township officers or at the instance of landowners along their routes.

"Where such enterprises have been allowed to proceed, and the expenditure of large sums of money has been permitted, it would be inequitable to correct at this time what was a mutual mistake, under the influence of which these enterprises have been pushed to completion; but it would seem desirable that such charters should not be granted in future until the Legislature has made such provisions for the assessment of damages to property as shall protect the owners from the additional servitude which the construction of electric railways does certainly impose upon all adjoining owners outside of municipal boundaries.

"The only remaining question raised in this case is over the right of a street railway to build any part of its line before it has the right to complete it. A steam railroad may enter upon any part of its line and commence building, subject only to its duty to complete the line in accordance with its charter. The reason of this is that it is clothed with the power of eminent domain, and may enter and appropriate land regardless of the will of the owner.

"A street railway company, as we have seen, does not possess the power of eminent domain. It cannot build under its charter alone. It must have the consent of the municipal or local authorities or it cannot move. If the proposed line passes through a city, borough or township intermediate the termini, and that city, borough or township refuses its permission, the power to building the road described in the application charter cannot be exercised.

"In this case the defendant's line of so-called street railway extends through two boroughs, two townships, and over one county bridge over the Schuylkill River. The line and circuit of its road over the several highways to be occupied is fully set forth in its charter.

"The consent of the local authorities of West Conshohocken borough and of White Marsh township were refused, that of Upper Merion township was given, that of the borough of Conshohocken was given, and has since been withdrawn. Under such circumstances the building of the line of street railway described in and authorized by the charter is impossible, and the company has no right to proceed."

The decree appealed from was reversed and the record remitted, with direction to the court below to make the decree recommended by the master awarding the injunction prayed for.

IN BEHALF OF CONNECTICUT ELECTRIC RAILWAYS.

The railroad committee of the Connecticut legislature on March 22 listened to an address by Judge E. B. Gager, of Derby, on behalf of the electric railways of the state. His speech was in the nature of a reply to addresses made by Vice-president Hall, of the New York, New Haven & Hartford Railroad Company, and representatives of the New York & New England Railroad Company. They urged the committee to take a stand hostile to the paralleling of steam roads by electric railways. Following is the substance of Judge Gager's address:

It is now something over a month ago that the officials of the Consolidated road served notice upon the street railway companies of Connecticut that the granting of any franchise to operate street roads parallel to the lines of that great corporation would be opposed before your honorable committee, and that at a future day the reasons for such opposition would be presented, At once the machinery of this corporation was set in motion to draw maps and compile statistics, and its able and eloquent vice-president has appeared before you with a carefully prepared statement and has presented its claims for your consideration. In the most formal and well considered manner the managing powers of this corporation, representing $38,000,000 of capital, have issued its manifesto and placed itself on record before the people of this State. The proposition made to the people of this State, if I understand it aright, is this:

There shall be no more street railways whose operation may diminish the earnings of the Consolidated road. "Thus far and no farther," is the language of Vice-President Hall.

The real thing our friends object to is competition by street railways, as they say, "cheap electric competition." Before looking at the detail of their plaintive appeal, let us see just what the nature of this "cheap electric competition" is. From the nature of the service it cannot extend to any considerable distances. Indeed, my friends concede this for they talk only of loss of local earnings, lost on short trips. The steam road does not stop as every man's door; its business is of the nature characterized as through business. We may well say, paraphrasing the language of my learned friend's argument, that we have no spirit of hostility to steam roads as such, if they will stick to their legitimate sphere. Stick to your fast expresses, your through trains, your freight transportation, but don't have the effrontery to say that no one shall give the people of this State that kind of service you can't give, because while giving that service some small fraction of your local earnings may be taken away. It is simply incidental that some of these street railway lines diminish your local receipts, but the traffic taken from you wouldn't justify the construction of the cheapest street railway line in the State. And the proposition advanced to this committee is in effect that the ninety-nine persons shall be debarred from convenient, cheap and frequent service, lest you may be deprived of the fare of the hundreth man who might otherwise travel your road. I say the nature of the service and the rate of speed of street cars necessarily prevent any competition over distances of any length. Section 13 of the Street Railway Law of 1893, absolutely limits the rate of speed of street cars to 15 miles per hour. and the local authorities may limit the speed still further. The railway map of the State is shaken out, and the red lines denoting the street railways are shown in some instances running along by the black lines of the steam roads, and the cry of "parallel" is raised, and the red flag of "foreign capital" is flung out to frighten the specter away. How absurd for serious men, knowing the legal limitation as to speed, and knowing the prohibitive limitations on competitive speed imposed by the conditions of the traffic to fly to the people's legislature for relief.

It is idle for Judge Hall to say the street railway was not designed or intended to furnish transportation from one town to another, that it was designed simply to take the place of a hack or omnibus. The steam road was first devised only to carry coal. The old stage lines might as well have contended against the introduction of the steam car as for the steam road to protest against the street road. Gentlemen, this push forward in the line of transportation is simply one of the marks of progress of the day, and if you will not give free scope for this progress, those who come after you will.

I have no hesitation in saying to this committee that whenever you find that a street road will not furnish more frequent transit, in a more convenient manner, at a cheaper rate, in that case there is no call for a street road, and two corporations ought not to be given franchises to do the same which one can do as well so long as the one is reasonable in its service and charges. No one wants to build a street road through the "desert wastes" Judge Hall talks of. We want to build, and ask permission to build, where and only where there are people to be served, as the steam roads cannot, by any possibility, serve them.

But let us turn now, for a moment. to the specified illustrations of loss given in my friend's argument. I cannot analyze them all. A few specimens will stamp the whole.

They say "between Norwalk and Rowayton a loss of 50 per cent. of the entire business." I find from their own figures, distance 4¾ miles. Electric, 3 and 10 cent fares; 10 minute service. The time table gives 15 east bound trains and 12 wast bound trains stopping at Rowayton daily. That is, the electric road gives not less than 84 trips, while the steam road gives but 27. The electric takes the passenger at his door and lands him right at his destination. Moreover, the loss is given in percentage. My friends don't tell how many people they actually carried between these points. But I venture to say the street road is carrying twenty times the people on this line that the steam road ever carried between these points.

"Bridgeport & Southport, a loss of 80 per cent." they say. Southport has 12 eastbound and 11 westbound trains daily. The street road gives 14 and 20 minute service.

"Bridgeport & Stratford, $35 per day," they say. Stratford has on the main line and the Naugatuck division 17 westbound trains per day and 19 northbound and east bound trains. The electric gives a 10 minute service.

"Waterbury & Naugatuck, 90 per cent. of all business." Naugatuck has seven southbound trains and six northbound, while the street road runs under 12 minute headway.

"Between Wallingford and Meriden, 30 per cent. of all business," Wallingford has nine north-bound trains and eight south-bound, while the street cars run under 30-minute headway.

"Derby, Birmingham and Ansonia 90 per cent. of all business." Between Derby and Ansonia there are eight trains each way, for the Derby and Naugatuck divisions run on practically the same time table, while the street road gives a 7½-minute service between the two villages. Their figures are for the past three months. But our road has been running for eight years. I believe the figures are untrustworthy. And now we come to Winnipauk and South Norwalk—50 per cent. less one way and 90 per cent. the other. Let me read from their statement filed with the committee:

"The business of Winnipauk was very small to start with, but has been still further reduced by electric competition. Twenty-two passengers were carried in 1893 during the month of December, and eight during the corresponding month of 1894, from South Norwalk to Winnipauk, and from 42 to one from Winnipauk to South Norwalk."

So I might go through the list, but time forbids. Gentlemen, I cannot put in a stronger argument for the public convenience and necessity of these lines than the elaborate tables filed by my friends, supplemented by their general time table and rate schedule. These tables show, in part, why some of their local traffic is taken. The steam roads are behind the age in the matter of local transportation and every man on this committee and in this Legislature knows it.

Now, what does all this amount to? My friends say in one of their reports filed with you that it means an aggregate loss of $4,000 per month on local fares, or a grand total of $48,000 per year on a total passenger income of $12,971,000, or a loss of about one-third of 1 per per cent—the "velvet of profit" that my friend Robinson tells of. And how does this loss affect the road? I am informed that during substantially this three months its stock has risen from $175 to $195. If I am wrong my friends will correct me. I find that this company paid last year $3,631,000 in dividends—almost 10 per cent. on its capital stock. Here my friends come up and ask the protection of the General Assembly because there is danger that local fares to the extent of one-third of one per cent. on passenger earnings may be lost, while they are paying 10 per cent. dividends and the capital stock has risen from $175 to $195. But let me read again from their report: The figures "show a loss of $4,000 per month on local fares, notwithstanding the general business of the road has increased."

I told you Judge Hall had argued our cause. Increased convenience of access to the stations of his road increases the through travel, more than compensating for the loss on local fares. Of course, gentlemen, there is no question about the roads already chartered. "Thus far and no farther" is the fiat of the Consolidated road. The argument from results already obtained is made for application to pending charters· Doesn't it prove that you should be liberal to these roads and to the people of the State in this matter of cheap, convenient, local transportation, and that free play should be given for the application of the principle of public convenience and necessity? The fact is, my friends are not willing to rest their opposition on this ground. They wish to prevent the people of this State from getting what public convenience and necessity call for.

I have already mentioned the street railway law of 1893. Street railway men recognized the possibility of a parallel and did not wish to interfere with the vested rights of any corporation. We met the representatives of the Consolidated road at New Haven and agreed upon a means of settling that question without turning the committee into a court to determine facts. All parties agreed upon section 8 of the street railway act of 1893 at the fair settlement of the question so far as legislative action was concerned, in part as follows:

"No street railway shall hereafter be built or extended from one town to any other town in the public highways, so as to parallel any other street railway or steam railway, unless by special charter prior to Jan. 1, 1893, until the company desiring to build, construct, or extend such railway shall have applied to the Superior Court or any judge thereof, and shall have obtained from such court or such judge, in the manner hereinafter required and provided, a finding that public convenience and necessity require the construction of such street railway."

We don't ask to be relieved from that act. It is fair to the steam roads, fair to the street roads, and above all, fair to the people, for it is their use which determines the question; and I affirm that any steam road which seeks to retain an advantage at the expense of the public convenience and and necessity of the people, determined by so competent a tribunal as our Superior Court, is seeking what is unfair, what is oppressive to the people and what justifies the feeling sometimes expressed that the State of Connecticut is to be handled for the benefit of the Consolidated road.

TO UTILIZE GROUND UNDER ELEVATED STRUCTURES.

The Metropolitan Elevated Railroad Co., of Chicago, has a large amount of real estate under its tracks which it is proposed to utilize. It is believed by some of the people connected with the company that the real estate under the tracks of the elevated road is capable of yielding a large income. A proposition has recently been made to the company by a syndicate for leasing a portion of the grounds just west of the river, and building up a great market district. It is believed that the real estate is well located for such a purpose, and that a market could be built there which would be readily accessible to all parts of the city after the union loop is built. Nothing definite has been done, but people connected with the company say that there is little doubt but some plan for the utilization of this ground will be worked out, and they think it quite probable that this market plan may be carried through.

Another idea which is being considered for making use of the land under the outlying portions of the road is one similar to a plan which has worked successfully in London under the elevated tracks of the steam railroads. It is the building of tenement-houses to rent at low prices, The road runs through most of its length adjoining a wide alley. With these alleys paved and one-story houses built on the right-of-way of the railroad, it is argued that much better quarters and greatly improved surroundings could be furnished for as low rent as people are now able to get for the same money in crowded tenement districts. All the houses would, of course be readily accessible by means of the road itself, and the building of them would itself build up a large traffic.—*Chicago Tribune.*

MASSACHUSETTS STREET RAILWAY STATISTICS.

The Massachusetts Board of Railroad Commissioners devotes a considerable part of its annual report, which has just been issued, to the street railways of the State. A summary of the essential features of this part of the report is given herewith.

Reports for the year ended Sept. 30, 1894, have been received from 68 street railway companies, eight more than in 1893.

The total length of street railway Sept. 30, 1894, including second track but not sidings, was 928,843 miles — an increase of 54,699 miles over the preceding year. Of this total, 824,971 miles were operated in whole or in part by electric power, and 103,872 wholly by horse power. This shows, as compared with the previous year, an increase 113,889 miles equipped with electric power, and a decrease of 59,188 miles equipped for horse power only.

In regard to the electric railway companies the report says: "All of the companies use the overhead single-trolley system, except the Milford & Hopedale, which used (when in operation) the storage battery."

Assets and Liabilities.—The gross assets of the companies, September 30, 1894, were $53,641,580.74. The gross liabilities, including capital stock, at the same date, were $53,020,295.13.

There was an increase in gross liabilities of $3,430,607 over the previous year, there was a gain of $3,511,308 in gross assets—a balance of $80,701 in favor of the companies, increasing by that amount their aggregate surplus.

The aggregate capital stock of the sixty-eight companies, Sept. 30, 1894, was $26,971,275, an increase of $1,087,700 over the previous year.

The whole amount of cash dividends declared and paid the last year was $1,610,886—an average of 5.97 per cent. on the total amount of capital stock outstanding at the end of the year, as against 6.63 per cent. in 1893. Computed (as it should be) on the mean amount of capital stock outstanding at the beginning and end of the year, the average dividend the last year was 6.10 per cent., as against 6.94 per cent. in 1893.

One company paid the last year 10½ per cent.; one paid 9 per cent.; one (the West End) paid 8 per cent. on preferred stock and 7½ per cent. on common stock; six paid 8 per cent.; one paid 7 per cent.; eleven paid 6 per cent.; one paid 5 per cent.; one paid 4½ per cent.; two paid 4 per cent.; two paid 3½ per cent.; two paid 3 per cent.; one paid 1 per cent.; and the remaining 38 companies, including new and old, declared and paid no dividends.

The average rate on the capital stock of the 30 companies which paid dividends was 7 per cent., as against 8.22 per cent. the previous year.

The aggregate funded debt of the companies Sept. 30, 1894, was $19,180,000, an increase of $5,079,000 over the previous year.

Passengers Carried.—The total number of passengers carried during the last year was 220,464,099, an increase of 6,912,090 over the previous year. The number of passengers carried on the street railways exceeded the annual number carried on all the railroads of the State by 111,029,915. The number of miles run by street cars was 36,722,978. an increase of 2,215,696 over the previous year. The total number of round trips run was 4,662,786—an increase of 181,615 in the number of trips. The average number of passengers carried per round trip was 47—one less than in 1893. During the last five years the number of passengers carried by the street railways was as follows: 1890, 164,873,846; 1891, 176,090,189; 1892, 194,171,942; 1893, 213,552,009; 1894, 220,464,099.

Income and Operating Expenses.—The total income of the companies from all sources, for the year ending Sept. 30, 1894, was $11,236,428.32, and the total expenditures were $11,034,646.02—leaving a net balance of income for the year of $201,782.30 to carry to surplus account.

The following table gives the percentage of operating expenses to gross income from operation for the last five years:

Years.	Gross income from operation.	Operating expenses.	Percentage of expenses to income.
1890…………	$8,318,285.22	$6,244 208.16	74 80
1891…………	8.861,841.07	6,746,303.54	76.13
1892…………	9,798,060.02	7,029,479.31	71 74
1893…………	10,832,174.16	7,501,815.07	69.26
1894……… …	11,119,816.05	7,729,058.82	69.51

It will be seen in the table that the ratio of operating expenses to gross income from operation has fallen in the last five years from 78.40 to 69.51 per cent.—a marked decrease. The percentage for the last year was about the same as that for the railroad corporations of the State, which was 69.34 per cent.

The average cost of the street railways of the State per track mile (including the cost, but not including the length of sidings), as it stood on the books of the companies Sept. 30, 1894, was $26,748.31 for construction; $11,527.81 for equipment; and $15,356.08 for land, buildings and other permanent property—making a total average cost of $53,632.20 for each mile of main track, including second track.

These figures are of value as showing how heavily the street railways as a whole are capitalized, or, in other words, the average amount per mile on which dividends and interest are to be earned. They furnish very little clue, however, to the cost per mile of any particular railway. The cost, as returned by the several companies, ranges from $11,152 to $97,993 per mile.

It will be of especial interest to note to what extent the cost per mile of railway has increased since the introduction of electric motive power, some six years ago.

The following figures give the average cost of railway per mile for the last six years:

Years.	Construction.	Equipment.	Other Permanent Property.*	Total Permanent Investments.	Capital Stock and Net Debt.
1889…	$16,180	$ 7,880	$11,116	$35,176	$33,907
1890…	17,335	10,658	11.415	39,408	38,256
1891…	17,919	11,614	12,202	41,735	40,890
1892…	19,520	15,215	12,558	47,293	46,184
1893 .	26,792	11,739	15,455	53,986	53,367
1891…	26,748	11,528	15,356	53,632	52,963

* Chiefly land and buildings.

In the last six years as seen in the labor the average cost has advanced from $33,695 to $53,632 per mile; and the increase of capitalization (capital stock and net debt) has kept somewhat more than equal pace with the increase in cost.

New Construction.—There was a decided slackening of pace the last year, as compared with the two or three preceding years, in the building of new lines and extensions. In 1892, there were 82.40 miles built and 119.29 in 1893. The last year there were only 54.70 miles of new construction which is less than the average for the last 10 years. How far the falling off was due to the general financial condition and how far to a less sanguine anticipation of extraordinary profits or speculative returns from street railway enterprises, it is difficult to say. There is reason to believe that a somewhat more sober and rational view in this regard has prevailed. There has been no dearth of capital seeking investment. Notwithstanding the extremely hard year through which our railroad corporations have passed, their stocks are sought by conservative investors at higher prices to-day than 12 months ago; and the same is true of some of the street railway stocks.

Volume of Traffic.—The street railways have suffered in their traffic from the general business depression far less severely than the railroads. While the number of passengers on the railroad lines fell off 8.64 per cent., and the freight tonnage nearly twice as much, there was a gain of 3.24 per cent. in the volume of street railway travel, and the gross earnings of the railway companies increased 3.53 per cent., while those of the railroads were reduced 9.60 per cent.

The rapidity of the annual growth of street railway traffic was, however, somewhat checked, as compared with the average rate of advance during the five preceding years since the introduction of electric motive power. In order to have kept up the same rate of progress, taking into account the relative increase in mileage, the companies should have carried the last year in round numbers 226,250,000 passengers instead of 220,500,000; or, to state it in another way, the gain in the number of passengers over the preceding year should have been 12,750,000 instead of 7,000,000. The fact that the actual increase was so large, or that there was any increase even, is evidence of the remarkable persistency and stability of street railway traffic, The figures of the last year demonstrate that street car transportation is not only a convenience, but such an absolute necessity in the every-day life of great masses of people, that even the hardest of times cannot materially diminish its volume and growth.

Earnings and Surplus.—The financial condition of the companies as a whole, though but little changed from the previous year, was changed for the better. The aggregate surplus, which had been reduced from 15 almost to 2 per cent. in the preceding seven years, was slightly increased the last year. This result was secured, however, by a reduction in the amount and rate of dividends declared. The amount of dividends declared was less by about $106,000 than in 1893. But 30 out of the 68 companies paid a dividend. The average rate on the capital of the paying companies was 7 per cent. as against 8.22 per cent. the previous year.

The floating debt was reduced about $2,750,000; but this was by the issue of stocks and bonds, and not by payment from surplus earnings.

The ratio of operating expenses to gross earnings from operation, which had shown the remarkable decrease of nearly 12 per cent. since the introduction of electric power, the last year made a slight increase.

Capitalization.—There have been the last year, it is gratifying to say, no visible instances of inflation or stock-watering; and, so far as appears, no further absorption of the control of domestic companies by foreign corporations or syndicates.

During the two preceding years, the average cost and capitalization per mile of railway, as returned by the companies, had increased at the rate of over $6,000 per mile a year. A considerable increase was in many cases entirely legitimate, as representing the higher cost of new electric railway, or the additional cost of equipping with electric power original horse lines. In other cases the increase was largely the result of stock-watering, pure and simple. The last year, on the contrary, there was an actual reduction in the average cost and capitalization per mile of railway as it stood on the books of the companies; and, although the reduction was small (about $400 per mile), it indicates a radical change in the right direction.

The necessity to the financial success of the electric system of keeping the cost and capitalization per mile of railway within the lowest practicable limits, was remarked in the last annual report.

By referring back to the table in the last report it will be found that the showing for 1894 is less favorable to the electric system than that for 1893. It appears that, notwithstanding the large gain in net earnings per single passenger and per car mile and round-trips run, the net earnings per total mile of railway owned have increased only 50.87 per cent., while the cost of railway per mile has increased 59.17 per cent., and the capitalization per mile 63.95 per cent.

It is hardly necessary to say that the figures as given above are the average showing for all the street railway companies of the State. It follows, as a matter of course, that the actual showing of some companies is better and of others not so good.

(*To be continued.*)

SPEED ORDINANCE VETOED IN BROOKLYN.

Mayor Schieren, of Brooklyn, has vetoed the ordinance recently passed by the Board of Aldermen for the regulation of the speed of electric cars. The following abstract gives the grounds on which the Mayor's objections are based:

My objections to the ordinance so returned relate more particularly to the provisions contained respectively in the first and fourth subdivisions of the ordinance. The provisions of the first subdivision are as follows:

1. No street surface railroad car propelled by electricity shall be run at a speed exceeding six miles an hour or 528 feet a minute within a radius of one-half mile from the City Hall, nor within a radius of one-half mile from the foot of Broadway, nor on that part of Fulton street lying between Sands street and Flatbush avenue; nor shall any such car be run at a speed exceeding eight miles an hour or 704 feet a minute within a radius of a mile of either of the two points first above mentioned, nor shall any such car be run in any other part of the first 28 wards of the city of Brooklyn at a speed exceeding 880 feet a minute at any time.

In my judgment the speed permitted by the provisions just quoted is, as to certain parts of the city, entirely too great. Outside of the one mile limit from the City Hall or from the foot of Broadway it permits a speed (badly expressed as not exceeding 880 feet a minute), which is equivalent by better expression to 10 miles an hour. It does not seem to me that a greater speed than 8 miles an hour should be permitted anywhere within the first 28 wards of the city. I think also that the limits within which the speed should be restricted to 6 miles an hour ought to be more definitely defined than in the provision under consideration. For instance, it might better be provided that the trolley cars should not be operated at a speed exceeding 6 miles an hour on Fulton street below Flatbush avenue, or on Myrtle avenue below Hudson avenue, or on Broadway below Briggs avenue, or on Grand street below Driggs avenue. By such a description the boundaries of the district are readily made apparent, both to the motorman and the general public.

The provisions of the fourth subdivision of the ordinance are as follows:

4. Not more than three passengers shall be allowed at any time to stand upon the front platform of any such car while the same is in motion, but the front platform may be used as well as the rear platform for egress and ingress of passengers.

I am clearly of the opinion, after full consideration of the matter, that the front platform of the car should never be occupied by any persons other than the motorman or conductor, or a police officer, The motorman should be left in such a situation that he will be free of any interference in the operation of his car. I am persuaded that if an ordinance were enacted requiring the front platform to be kept free, except as I have stated, many accidents which happen because of an obstructed front platform would be avoided. To say that three passengers shall be allowed to stand at one time upon the front platform is not to secure the free action of the motorman.

At the meeting of the Council on Monday last the veto was read and the following ordinance framed in accordance with the views of Mayor Schieren was adopted:

No street surface railroad car operated by electricity in any of the streets, avenues or public places of the city of Brooklyn shall be run at a rate of speed to exceed six miles an hour on Fulton street, between the ferry and Flatbush avenue; in Myrtle avenue, between Fulton street and Hudson avenue; in Broadway, between the ferry and Driggs avenue, and in Grand street, between the ferry and Driggs avenue; nor in any part of the first 28 wards of said city, at a rate of speed to exceed eight miles an hour.

No persons except motormen, conductors or police officers in uniform shall be allowed on the front platforms of any such cars when in operation, except that such platforms may be used for the exit of passengers at the corner stoppages. The rear platform gate on the track side of every such car shall be always kept closed,

NOTES ON RECENT ELECTRICAL ENGINEERING DEVELOPMENTS IN FRANCE AND ENGLAND.[*]

PART II.

The President: Before calling on Mr. Leonard to close the discussion I wish to voice what I am sure are the sentiments of the meeting, by saying how much we have enjoyed this able paper, and how the value of the paper is evidenced by the very general discussion it has called forth.

I would like to say on my own part that I do not share Mr. Leonard's fear as to the evil effects of gigantic corporations, although I do not desire to be regarded as speaking unqualifiedly in favor of them. I do not think, however, that the statement made, that the practical development of engineering improvements is opposed by the gigantic corporations in the electric field, is warranted by the facts. On the contrary, if I have read aright the history of progress of electrical engineering science in this country, it has not been in spite of the gigantic corporations, but by reason of such corporations that such progress has been made. If here and there an inventor does not succeed in getting his particular system adopted by a corporation, he may, perhaps, naturally feel that such corporation stands in the way of its introduction. But we should not lose sight of the fact that these corporations are in the field for business, and will be apt to buy anything that has real commerial value. It might be true, if all the corporations were represented by a single body, that such gigantic monopoly might absolutely discard anything of value. But when we remember that there are several, perhaps, three or four or half-a-dozen, it is evident that a live company or corporation cannot fail to see the advantage of anything which possesses true merit.

I have shared the general surprise of probably some of you here in learning that the Heilmann locomotive, a locomotive that practically carries a central station with it, can show such favorable figures, as it appears to, regarding economy. It is a matter of great surprise to me, and I am rather disposed to think that a great deal of the supposed advantages possessed by the Heilmann locomotive, will, in fact, be found to consist in an improvement on mechanical locomotive practice. If, however, it be true, what we have claimed for the great flexibility of electricity as a means of long distance transmission of power, will, it seems to me, to a very great extent be lost. It is a very interesting question, however, and I shall look to the solution of it with considerable interest. Of course, I recognize the question of speed as being in favor of the electric locomotive.

I will only say in conclusion, that as to Mr. Leonard's fear least all consulting engineers should be controlled by these gigantic monopolies, that he affords a notable instance of an able one who, I believe, has not yet been so controlled.

I will now call on Mr. Leonard to close this discussion.

Mr. Leonard: I have so many points to answer that I hardly know where to begin. If I inadvertently embraced far more in the scope of my paper as regards the central stations abroad than I should have done, I regret it, and I can see upon reflection that there is cause for criticism if I have made remarks that are so sweeping as to involve stations which I did not see. In saying that undoubtedly we have the best three-wire central station plants in the world, I judged largely by my familiarity with those in this country by observation, and those abroad, which I have not seen, by published descriptions. But one point which I wish to mention is, that I do not consider that any conclusions can be arrived at in judging the matter by the question of how many watts are delivered to the customer per pound of coal. The coal in the cost of the central station energy is less than 10 per cent. of the cost. It may possibly be that such stations abroad may show better results than ours as judged by the statistics compiled by the National Electric Light Association. But I hardly think this would necessarily be a criterion either, because we all know the care with which statistics are prepared by foreigners, especially Germans, and we also most of us would be inclined to doubt whether all of the best of our United States stations had submitted full, detailed and accurate figures as to their production, to the committee that published the results in question. There are a great many points concerned in what I would consider the best three-wire plants, which are not at all covered or rubbed out by the question of the watts produced per pound of coal, and among them are the question of the perfection of distribution of pressure, the question of kilowatt hours produced per annum, per dollar of capitalization; and especially the question of how much earnings the station is making per dollar of investment, in which latter two points I am quite confident, although I have not the figures to back up the statement, that we are ahead of the European practice. I was very much surprised to hear one of the speakers state that the load factor of the New York Edison central station was 34 per cent., and I am almost forced to conclude that we differ as to the definition of load factor, for I had occasion personally to secure unquestionable returns in 1890 from the central stations in Chicago, Brooklyn, New York, Philadelphia and Boston, and at that time those stations averaged about 40 per cent. for the load factor, and the New York station was the best of the lot, and I can only explain any such falling off as is represented by the present load factor of 34 per cent. as due to the taking on of too many of these fluctuating loads like elevators. As regards the question of the load factor again I happened to be with the president of the Chicago Edison company on my visit abroad, and while there he received complete statistics from Chicago in regard to the operation in December, and the load factor there during December was over 50 per cent. The speaker perhaps did not understand that my remarks were limited as regards the quotation as to the load factor in London to the month of December in which, of course, the load factor is higher than would be ordinarily the case.

Another speaker spoke of 28 lbs. per kilowatt hour not being correct relative to 15.7 lbs. per indicated horse-power hour. I think these figures will bear scrutiny, and I call attention to the fact that the first one was in feed water per kilowatt hour in useful electric energy and not horse-power hour, and the second is per indicated horse-power hour.

As to the argument which has been presented by more than one, that while the Heilmann locomotive has a larger boiler that there is no reason why similarly a steam locomotive should not have a larger boiler, I beg to say that while I do not profess to have any very great amount of knowledge on that subject, I have given some considerable attention to it of late, and have noticed the comments and the writings of a good many persons who claim to be very well versed and apparently are, judging by their papers and by their standing, and the impression that I have derived is that there has been reached, very closely, a limit in the size of the steam locomotive boilers; that to make and place a larger boiler upon a locomotive to day leads to such difficulties in many other ways as to be practically prohibitive, and I can only wonder if they can run with a steam boiler sufficiently large, why they burn twice as much coal as we do with stationary boilers. There seems to be no question that they do burn more coal to produce a horse-power, and that it is due to the fact that they do have too small a boiler and crowd it to hard. If they can, why don't they put on a bigger boiler?

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[*] Discussion of H. Ward Leonard's paper by members of the American Institute of Electrical Engineers.

As to the cost of batteries, engines, etc., relative to each other, the figure of $107 per kilowatt, I think, is quite close to the mark of present practice, and I will say that in discussing this question with one of the best posted men in England, after considerable argument and figuring on his part, he stated that the cost of batteries, such as they made, would be $175 per kilowatt. As to the cost of engines, boilers and generators, I am satisfied that if any such figure as $100 per horse power has been quoted, that it must have been intended not to cover the boiler, engine and dynamo merely, but possibly the value of the real estate and buildings, etc., which they represent also, and which I have not included in my figures, as there is no doubt but that large boilers, engines and dynamos can be procured not only at $50, but I believe at considerably less per kilowatt.

A criticism was made as to the suggestion of placing the batteries upon the consumer's premises instead of the station. I think the speaker has lost sight of the fact that the only argument in favor of placing the battery in the position which I suggested, was to enable the customer to obviate the necessity of calling upon the central station for these large spurts of energy which he required with its consequent high cost, due to small load factor at the rates I named. Placing the batteries in the central station would not correct the disturbance of lights or the drop in the conductors affecting other consumers, nor could the station afford to give to the customer such a low rate when these variations in the customer's load is still in existence, as he could if it was a constant current supplied to the customer for 24 hours per day. I must say that, knowing the general views of American central station managers about storage batteries, I thought it would be rather in consonance with their ideas if they could get a customer to buy the batteries and maintain them.

As to the $300 per kilowatt, that $300 per kilowatt represents not, of course, merely the boilers, engines and dynamos, but it represents the underground system, which is very expensive per kilowatt, also the real estate and buildings, and possibly the usual percentage for the franchise, patents, etc.

I had no intention of impressing my hearers with the idea that the European practice was ahead of ours at the present moment. In fact, my opening clause stated that I was in doubt as regards the matter. But I did point out that they were making more progress than we were in this country in trying new methods, new apparatus and new combinations, diverging from the old beaten paths, and I consider that practice due to the fact that there are so many concerns over there which are considered first-class and are almost always in any competition which arises. In this country when a large central station plant is to be installed, as we all know, it is not competed for by 25 or 30 concerns, the majority of whom are engineers who understand the entire construction of the work and manufacture the apparatus in addition, but generally the plants are built by the people themselves, by some one of their employees, merely purchasing the apparatus from some one or two or three manufacturing concerns.

As to the question of dynamos and motors and the argument that we have, as I thought, better dynamos and motors than they have abroad, I can only say that I think the best reason for this is that there are no patents on them which even the smallest concerns are afraid of, and therefore we do have active competition from the smaller concerns, which do not have large capitalization due to patents and heavy fixed charges, which necessitate the large profits of corporations such as I was commenting on.

The point as to the batteries not having been properly estimated by the fact that three and one-tenth watts was assumed, is not correct. The lamps were assumed at three and one-half watts per candle. Even if for the sake of argument it be assumed that the battery will cost $80 or $90 per kilowatt as against $50 for engine and boilers and dynamos, it would not affect the conclusion materially.

As to why the cost of small dynamos and motors is higher in European practice than here I do not know; but I am inclined to think that one of the reasons is that in this country the present popular method is for the manufacturers to bid on the machine delivered f. o. b. without any further work done in connection with it, and consequently there is very little chance for argument one over another, if the machines are very good and the competition is very keen. Whereas the method abroad is for the man who builds it to install it. In other words, the men who are manufacturers are generally electrical engineers, and they build and wish to install their own machines and consequently do not care to bid so low on the dynamo alone.

One of the speakers mentioned that there was no reason why there should be any more difficulty in the ordinary locomotive in taking care of the steam and using it economically in the cylinder and delivering it rapidly and exhausting it properly than there would be with the Heilmann locomotive. But I call attention to the fact while, of course, it is theoretically conceivable, that we should have a type of valves independently controlling the admission and exhaust in the ordinary locomotive, such as we have on stationary engines, we do not have them. It has been tried and retried, and they have stuck to the simpler type of Stephenson link and slide valve, because the additional economies obtained by the use of the higher class of valve motion did not compensate for the additional complications introduced, which, however, does not apply at all to a steam engine placed above on a platform in which the most refined mechanism can be used to the best advantage.

I would like to call attention to one thing that I do not think I mentioned in the paper, and that is that by actual test by the engineer of the Chemin de Fer de L'Oest, who conducted the test of the Heilmann locomotive, they did operate the Heilmann locomotive over exactly the same distance, the same roadbed, running on the same time, hauling the same weight, the conditions being identical in every particular, and the amount of coal used by the Heilmann was 24 per cent. less than the amount used by their best compound locomotive.

A point which was made by one of the speakers was that there was no reason why if we used 16 wheels we should not be able to do just as well as the Heilmann does with its 16 wheels. It seems to me that it would be difficult to conceive a steam locomotive with 16 driving wheels. It would meet with difficulties upon the curves, and the rigidity of the steam locomotive is certainly going to be troublesome if we come to make a machine 50 feet long all upon the drivers, and I wish to emphasize the point that every pound of the weight of the Heilmann locomotive is resting on springs, and there is no such rigidity of the wheel base. There is the four-axle bogie at one end which has a flexible arrangement connecting it to the platform above, and a similar bogie at the other end, and there is no such difficulty as regards rigidity of construction as it seems to me would be met with in the steam locomotive under the same conditions. And, furthermore, it impressed me that there is not an exact parallel, for the reason that a part of the 16 wheels counted as belonging to the steam locomotive by the speaker are on the tender and they are not at all effective for traction.

As regards the question of wear, and the statement that one-third of the cost of maintenance of roadbed and locomotive is represented by the destructive effects of the hammer blow and side thrust, I certainly would not dare to make any such figures as that for myself, I got that figure from a discussion which was held recently before the Civil Engineers' Society and the figure was one which seemed to be agreed upon by more than one speaker. The speaker who named that figure, I think, was Mr. Strong. At any rate it was one whose name was familiar to me as that of a man who has had a very wide experience and is a pretty good judge of such matters and whose statement ought to be rather authoritative.

Another point I wish to bring out is this—they made measurements of deflection in crossing bridges in the case of the Heilmann locomotive and in the case of the compound reciprocating steam locomotive, and the deflection measurement showed that the deflection in the case of the steam locomotive was 80 per cent. more for the same weight than in the case of the Heilmann, which, of course, is attributable to this hammer blow effect and which one of the speakers has pointed out has been found, in the case of a little error in the counterbalancing, to be sufficient to entirely lift the weight of the locomotive from the rails at times, as evidenced by tests at Purdue.

I agree with one of the speakers who said that he thought that our progress was not in spite of, but by reason of the big corporations; because I think that such progress in the engineering line, as we have been lately making, has necessarily been made by these corporations, because they have blocked other people who were trying to go ahead.

The same speaker mentioned the misfortune of losing the flexibility which we had all been attributing to the electric locomotive as compared to others, and that in the Heilmann that flexibility seemed to be lost. It seems to me it would be difficult to find a finer example of the flexibility of electrical transmission of power than is illustrated in the Heilmann locomotive. We can have an engine running at constant speed in one direction, and from that we can get any possible reduction or any torque we desire and any speed in either direction, and the flexibility is as perfect as is conceivable to my mind. In fact, it seems as though the electric energy were used there as a flexible connecting rod acting through an infinite number of gears, and acting between the source of power and the work that was to be done.

Another point which has occurred to me is that conceiving that we could put bigger boilers upon our locomotives, bigger drivers and cylinders, until we finally could secure the horse-power necessary to handle the high speed or large loads, one difficulty which I have recently noted about an engine of that kind is that it cannot start. It may run at full speed when it is in motion all right, but even with the drivers we have to-day and with the boilers, etc., it is impossible for the Empire State express to start itself at Albany, and it is necessary that a freight locomotive, a slow speed locomotive with eight or ten drivers should come along at the other end of the train and push it before it can start. No such difficulty as that pertains to the Heilmann locomotive or any similar locomotive, because there is an unlimited torque for starting, and I point out that the two limitations in present practice for locomotives are, it seems to me, that we want to go faster, that is one point and as to that, we have every advantage in connection with the electric locomotive; and the other point is, we want to pull more freight cars up a grade, and we can do that better with an electric locomotive than to my mind we can ever hope to do with a steam locomotive.

ELECTRIC TRACTION ON THE NEW YORK CENTRAL FALLS LINE.

It is announced that the New York Central Rail road Company proposes to introduce the overhead trolley on its line running from Niagara Falls to Buffalo. The plan of the company is explained in this statement from H. Walter Webb, third vice-president of the New York Central:

"This will be an electric branch before long. We are surprised that we did not think of the idea before, and are still more surprised to find how cheaply we can make the change. Our tracks up there are not in use all of the time, and it will be possible to run frequent trains at a high rate of speed, to accommodate local traffic, in a way that would be impossible on a steam railroad. The power to operate our trains can be obtained from the Niagara Falls Power Company, in which some of us are heavily interested. Special cars of the observation pattern will probably be built, so as to give passengers a fine view of the river and falls. The present plan contemplates a trolley system of such power that the improved coaches can be drawn over the line at the same rate of speed as at present. The fares will be reduced, and the comfort be far greater, as there will be no cinders, smoke, and other inconveniences of a steam railway. We hope to have the road ready when the excursion season opens, at the latest, as there is little to be done in making the change."

COMMENTS AND VIEWS OF CONTEMPORARIES.

WHO BELIEVES THIS?—It is doubtful if the street car monopoly makes as much money charging a five-cent fare as it would with a lower rate. The increased business would probably greatly increase its receipts without any corresponding increase of expenses.—*Milwaukee News.*

TROLLEY VS. STEAM ROADS.—If the steam roads recover a portion of their lost suburban passenger traffic by reducing fares to the trolley rate the people will secure the chief benefit, and this they will owe entirely to the introduction and competition of the trolley lines.—*Philadelphia Times.*

THE ELECTRIC BRAKE.—At present nothing but the muscle of the motorman stops the vehicle, and when it is going rapidly it is hard to check it quick enough to insure the safety of a person crossing the track 100 feet in front of it. The brakes are well enough for horse cars, but something more prompt and powerful is required for these heavier and fast moving structures. Both hands of the motorman are now employed, and it is no wonder that he sometimes becomes "rattled," with two handles to operate. If a single crank were used, to be turned, say, to the right to put on the current, and to the left to throw it off, and at the same time to put into action a brake that should be operated not by a weak human muscle, but by the power of the electric current, it would simplify the man's work, relieve him of much wear and tear, and measurably insure safety.—*Brooklyn Eagle.*

STEAM VS. ELECTRICITY IN CONNECTICUT.—This week the Vice President of the New York, New Haven & Hartford Railroad appeared before the Committee on Railroads of the Connecticut Legislature, arguing in an elaborate speech, against the further extension of existing trolley lines, and inferentially for their suppression, on the ground that they are a scheme of "outsiders" to "wreck" the railroads of Connecticut. He produced a map to show that the electric railroads now in existence, or chartered or asking charters, would form a line paralleling the New York and New Haven road from the State line to Springfield, Mass., and claimed that this sort of competition will prove "quite as harmful as the parallel lines of steam railroads which capitalists have vainly tried to obtain the Legislature's permission to build." Most interesting of all is the boldness of this claim that any sort of competing transit must be barred by this Legislature in the interest of that railroad for all future time. This claim would interpose such a barrier to human progress as has never been concieved. It is to be expected that even the conscience of a Connecticut Legislature will revolt against it.—*New York Telegram.*

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FINANCIAL NOTES.

Reported Deal of Magnitude in New York.—Negotiations are pending between the Metropolitan Traction Company and the Third Avenue Railroad Company for the control of the latter by the former, with a fair prospect of the deal being successfully consummated. If it should be successful it will be one of the most important moves made by the Metropolitan Traction Company recently, as it will remove one of the company's greatest competitors. The two companies have for sometime past been endeavoring to secure certain valuable franchises in the upper west side of Manhattan Island. —*Philadelphia Stockholder.*

Rental for the Down-Town Elevated Loop in Chicago.—The rental which the several railway companies of Chicago will pay for the use of the downtown loop, to be built by the Union Company, has up to this time been kept a secret. It is now reported, however, that the four elevated railroad companies have each agreed to pay $67,500 a year for the use of the terminal, or a total of $270,000. This is at the rate of 5 per cent. on $5,400,000. Each road is to pay the same, regardless of the mileage or the number of passengers it carries. This affords a basis for some calculation regarding the advantages which the elevated roads will receive from the loop. Each road's proportion of charges will be equal to $186 a day. It will be necessary to carry 3,720 passengers a day to meet that increase in the fixed charges, and it will, of course, be necessary to carry an additional number of passengers to meet the operating expenses of the trains running around the loop. No one will doubt probably that the improved facilities which the loop will offer will increase the traffic of each road far more than 3,700 passengers a day, and it is therefore easy to see how those who have faith in the advantage of a down-town terminal can calculate that the increased business will be vastly in excess of the increased charges. At the same time it can be seen that there is great profit in this enterprise for a loop company. The cost of the construction of the loop will, of course, be nowhere near $5,400,000, and probably little, if any, over $2,000,000 will be required to erect the structure.

Long Island Receivership.—The Brooklyn *Eagle* says regarding the appointment of a receiver for the Long Island Traction Company: "The real reason for the receivership may be stated in the one very brief sentence. Without a receiver it was impossible to offer anyone sufficient inducements or sufficient security to raise the money needed. This is the cause in a nutshell. The circular to Traction stockholders, dated March 19, practically admits this when it says: 'This application · · · is simply an anticipation of like action which · · · might ultimately have been necessary in order to accomplish the prompt and successful reorganization of the company.' This circular, however, gives another ostensible reason for the present action. It says: 'After the circular of March 8 was issued, hostile proceedings were threatened against the Long Island Traction Company, which, if taken would, in the opinion of your committee, have been injurious to the best interests of the larger number of the creditors and the stockholders of the company." It would be interesting to know just what the hostile proceedings might be. The persons interested in the present receivership have been asked to provide a commentary upon this paragraph. All that could be obtained from Mr. Morse was the statement that "certain parties were getting ready either to apply for a receiver friendly to themselves or to take legal action which would seriously embarrass the movement toward reorganization." It is a rather peculiar fact that outside of the close inner circle a very little is known about the receivership application. The affidavits upon which it was based and the reasons given to the court showing the necessity for such a step not only have not been made public, but have been refused to an *Eagle* representative. All that is known is that action was taken by certain of the collateral trust note-holders, and that it was successful. Why these note-holders, whose interest has been paid, should have been active in the matter is not clear, unless upon the following basis: That the security back of the notes is principally the lease, and that there was danger that the lessee company should default, thus making this security valueless."

NEW INCORPORATIONS.

Lock Haven, Pa.—The Lock Haven Traction Company, of Lock Haven, capital $10,000, has been chartered. Among the corporators are Charles A. Bragg, N. J. Mitchell and George Breed, of Philadelphia.

San Francisco, Cal.—The Los Angeles Railway Company has been incorporated. The capital stock is $4,000,000. The promoters are Lovel White, Thomas Brown, of San Francisco, Cal., John D. Bicknell, Los Angeles, Cal., A. H. Payson, San Mateo, Cal.

San Francisco, Cal.—The Moraga Valley Railroad Company has been incorporated with a capital stock of $500,000. The promoters are Angus A. Giant, Albuquerque, N. M. Archibald J. McDonald, San Francisco, Cal., John T. Williams, Oakland, Cal.

South Bend, Ind.—The Interstate Power Company, with a capital stock of $100,000, has filed articles of incorporation. The purpose is to expend some $50,000 to build a dam across the St. Joseph River north of South Bend, and near the Michigan line to provide power for furnishing electricity to South Bend, Niles, Buchanan and Berrien Springs, Mich. It is said an electric road will be built from South Bend to St. Joseph, Mich.

Rochester, N. Y.—The Rochester, Charlotte & Manitou Beach Railroad Company has been incorporated. This is the reorganized Grand View Beach Railway Company, and it is capitalized at $100,000. The stockholders of the new organization are: Michael Doyle, Charles W. Briggs, Louis Warfield, Valentine Fleckenstein, Emmett H. Craig, Martin Beattie, George M. Brown, Jacob Odenbach, Otis H. Robinson, H. F. Huntington, J. V. Alexander, Charles E. Woodward, J. Henry Howe, John A. Burgess, James L. Hotchkiss, George A. Gillette and Herman Behn.

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NEWS OF THE WEEK.

Detroit, Mich.—The Detroit Railway Company has recently petitioned for franchises for additional lines.

Manchester, N. H.—The contract for the construction of the Manchester Street Railway has been awarded to Soule, Dillingham & Company, of Boston.

New York, N. Y.—The Metropolitan Traction Company is soon to extend its cable system to the Sixth Avenue and Twenty-third Street lines that are under its control.

New York, N. Y.—A syndicate of New York and Atlantic City capitalists has formed a company which is to be capitalized at $4,000,000, to build an electric railroad from New York to Atlantic City.

Waxahachie (Tex.) Road Sold.—The Lake Park Street Railway property comprising 17 acres of land, 12 mules, 4 cars, house and barn, has been sold for $3,000 to Font Ray. A new company will be organized.

Boston, Mass.—The West End Street Railway Company has refused the demand of the floormen employed at its various car houses for increased pay, and also refuses to have a conference before the State Board of Arbitration.

Boston, Mass.—The bill authorizing street railway companies to acquire, hold, equip and maintain real estate for the purpose of recreation and pleasure resorts has been passed in the House, after debate, to a third reading.

Ottawa, Ill.—The franchise of the Ottawa Electric Street Railway Company's south side lines has been forfeited by the City Council, because of its refusal to operate its cars the full length of the line, the forfeiture to take effect March 29.

Ansonia, Conn.—It is reported that negotiations are in progress for the purchase of Wallace & Sons' brass and copper plant by W. A. Clark, millionaire mine owner of Montana. The business is now conducted by three trustees in the interest of creditors.

Akron, O.—The Akron & Cuyahoga Falls Rapid Transit Company will be enabled to complete its line through Akron from Cuyahoga Falls to Barberton, as Judge Hutchins has handed down a decision dissolving the injunction against the company.

Weymouth, Mass.—The Braintree & Weymouth Street Railway Company is to erect a car house, repair shop, etc., at Weymouth Centre. The building will be 80 × 125 feet and cost $5,000. The company intends to have its extension to South Weymouth in operation before July 1.

Brooklyn, N. Y.—Two motormen employed by the Atlantic Avenue Railroad Company were found guilty last week by Justice Walsh of running their cars at a dangerous rate of speed. One ran his car at the rate of 12½ miles an hour, and the other at the rate of 19½ miles an hour. Justice Walsh fined each of the motormen $20

Buffalo, N. Y.—A new electric railway is to be built this spring, and will be in operation, it is said, about July 15. The line will connect with the Buffalo street railroad at Seneca street, and will follow the Indian Church Road to Gardenville and thence over the Union Road to Ebenezer. The road will cost about $10,000.

New York, N. Y.—The Metropolitan Street Railway Company has decided to renew the effort for a cable road on Fifth avenue below Twenty-third street. A bill will be introduced in the Assembly asking for the repeal of the law of 1885 which prohibited the laying of railroad tracks on Fifth avenue, except for necessary crossings.

Lorain, O.—It is announced that the rights of way for the Cleveland, Lorain & Welling Electric Railway lines have been procured and work on the construction will be commenced May 1. The two roads will unite with the Johnson line connecting Elyria and Lorain, making a total length of 42 miles, the largest railway system in Ohio.

Boston, Mass.—The new West End car house on Washington street, Dorchester, to be used as a terminus of the Meeting House Hill and Grove Hall, Dorchester, electric lines, has been opened for use. The new car house is a commodious structure, containing 10 tracks, all branching from one main track, and has accommodations for 70 cars.

Philadelphia, Pa.—It is announced that a traffic arrangement has been entered into between the Philadelphia Traction and Southern Passenger Railway companies, under which the former will operate the latter company's line. The Southern company, however, is to construct its own road, and work is now in progress on Carpenter street, east of Thirteenth.

Media, Pa.—The Clifton Borough Council has voted to bring an action at law against the Philadelphia & Delaware County trolley road, running through the borough, for failure to pave Baltimore avenue. The provisions of the ordinance, giving the road the right of way, stipulate that a certain amount of paving must be done between the rails, and also for 14 inches outside the tracks.

Irwin, Pa.—Mervin Thompson, representing the Greensburg and Pittsburgh Street Railway Company, has closed the contract for power to operate the line from Greensburg to Turtle Creek with the Irwin Electric Light and Power Company. Two lines will be built from here, the first along the pike and the other on the west side of the Pennsylvania Railroad, through the towns of Larimer, Stewarts and Wilmerding.

Boston, Mass.—Those interested in the proposed electric road from Stoughton to Canton and Sharon elected these officers for the ensuing year: Elisha C. Monk, President; Henry W. Britton, Treasurer; A. M. Bridgeman, Clerk; Alfred Upham, Henry L. Johnson, Charles Tenny, Melvin Upham, George Mantle, A. M Bridgeman, Hon. E. C. Monk, Directors. It was voted to call the road the Stoughton, Canton & Sharon electric road.

Washington, D. C.—Vice-Consul-General Tyler, at Teheran, has reported to the State Department that an American citizen holds concessions for drilling artesian wells for irrigation purposes throughout Persia, and for the introduction into that country of electricity in its various forms, outside of telegraphy, which already exists. The concessionnaire has not, however, been able to secure sufficient capital to push these enterprises to a successful issue.

New Orleans, La.—The Orleans Railroad Company has let the contracts for the remainder of the equipment of its line. The contract for the cars was awarded to the J. G. Brill Company, of Philadelphia. The trucks will be furnished by the Baltimore Wheel Company. The rails are to come from the Johnson Company, of Johnstown, Pa. C. E. Loss & Co., of Chicago, will do the construction work, and Mr. Loss expects to break ground about April 3.

Syracuse, N. Y.—Since the new Solvay line of the Syracuse Street Railway Company has been in operation there has been so little traffic on the Geddes line that the receipts have been just about sufficient to pay the wages of the drivers, to say nothing about wear and tear, feed and care of horses and other incidentals. As a result, the receivers of the Consolidated Street Railway Company will ask the court for permission to discontinue the operation of the road.

Baltimore, Md.—The Baltimore Traction Company proposes to secure palace cars for trolley parties during the summer. It is likely the cars will be run to the Arlington and Gwynn Oak sections and will be leased to parties for the evening. Arrangements will also be made to serve luncheon on board the cars, and music will be furnished. It is also proposed to have electric launches placed in the waters of the Spring Gardens, in the vicinity of Long Bridge, and the waters at Fort McHenry and the mouth of the Patapsco.

New Orleans, La.—The injunction sued out some days ago by the New Orleans City & Lake Railroad Company, and other street railway companies, against the State Board of Arbitration, restraining the board from proceeding with the trial of the charges preferred against the companies by the street railway employees' union has been dissolved by Judge King, of the Civil District Court, and the board will now be enabled to proceed with the trial of the charges as soon as it has a quorum for the transaction of business.

Albany, N. Y.—A project for the construction of an electric railway from Albany to Schoharie, a distance of 31 miles, is under consideration. Several weeks ago the surveys were completed, and an inspection has just been made by several of the projectors with a view of gaining a better knowledge of the topography of the route proposed. John W. McNamara, the general manager of the Albany Railway Company, has been acting as advisory counsel for a number of capitalists who think favorably of building the road.

Philadelphia, Pa.—At a meeting of the Clerical Brotherhood composed of ministers of the Protestant Episcopal Church, held this week, the committee, which was appointed sometime ago to investigate the condition and treatment of the employees of the trolley roads, read its report, which was adopted. The report embraced an appeal to the directors and presidents of the various passenger railway lines, asking them to provide some means to protect their motormen from the great suffering and danger to health caused by want of proper shelter from the weather, and advised the use of the inclosed platform.

Cincinnati, O.—The Hamilton Turnpike Company has granted the Cincinnati, Middletown & Dayton Traction Company the right to operate a double track electric road over the pike from Carthage to Hamilton. The tracks are to be 30 feet apart, and this will necessitate the improvement of the pike to its full width of 80 feet, forcing many encroaching property owners to set back their fences. The consideration is $15,000, one-half cash, and a regular percentage of the earnings of the road. The villages of Carthage, Wyoming and Glendale will contest the graut.

Philadelphia, Pa.—The Schuylkill River East Side Railroad Company, has filed a bill in equity asking to have the Electric Traction Company restrained by injunction from tunneling its roadbed at a point below South Street Station. The railroad company says it is willing to consent to the tunneling of the roadbed, provided the Electric Traction Company will perform the work under the supervision of its engineer, and be responsible for any damages that may result therefrom. But the Electric Traction Company has refused to entertain the proposition, claiming to have exclusive rights in the premises.

Philadelphia, Pa.—L. H. McIntire, chief engineer and general manager of the People's Traction Company, lectured before the Epworth League of the First Methodist Church of Germantown on March 25, on "Electricity as Applied to Railroad Service." Mr. McIntire began by discussing the development of electricity at the power station, its transmission through underground conductors to various parts of the system and its operation through motors. As an apt illustration of the circulation of the electric current, he compared it to the circulation of the blood, the power station being the heart; the positive conductors the arteries; the motors, the capillaries, and the rails for the return circuit, the veins.

Brooklyn, N. Y.—The Coney Island & Brooklyn Railroad will open an extension of its line to Coney Island next week. The road now ends at the corner of Gravesend and Fort Hamilton avenues, but with the extension it will go through the Ocean Parkway to Ocean avenue and thence to the Willink entrance of Prospect Park. The extension was formerly known as the Prospect Park & Flatbush Railroad, and was operated by horse power. The Coney Island and Brooklyn Company secured permission from the Board of Aldermen several months ago to change the motive power to electricity, after promising to remove its tracks on Fort Hamilton avenue from the Park plaza to Gravesend avenue, that avenue being wanted for the new parkway plans. Cars will now be operated directly from the Willink entrance of the park to Coney Island.

Pittsburg, Pa.—It has been announced that an electric road will soon connect Pittsburg with Johnstown. The scheme, as it appears on paper, promises to parallel the Pennsylvania railroad, and become a formidable rival in the field for local passenger business. The backers are said to be the present owners of the Second avenue plant, which only recently passed out of the control of J. D. Callery and other Pittsburg capitalists. The present line is now operating to Braddock with some success, and an extention is now building from that city to McKeesport. Thence it is schemed to extend to Brinton, Walls, Jeannette, Irwin, Greensburg, Nineveh, Cambria to Johnstown. The present owners of the Second avenue line live in other cities, and nobody here seems able to substantiate the story. Between some of the towns named, and in almost all of them, there are successful trolley lines, and the endeavor of a certain syndicate to get options on all these probably gave rise to the suspicion that a trolley line was to connect this chain of towns. The Pennsylvania railroad people, it is stated, express mild surprise at the idea.

PERSONALS.

Mr. L. E. Myers, of the Electrical Installation Company, Chicago, was in New York this week.

Mr. J. C. Morse has retired from the presidency of the Illinois Steel Company, of Chicago, and has been succeeded by Mr. J. W. Gates.

TRADE NOTES.

The Deane Steam Pump Company, of Holyoke, Mass., has recently issued several pamphlets illustrating and describing in a condensed form several of its leading machines and specialties including Deane triplex power pumps, duplex pumps, patent pump apparatus for artesians wells, etc. These will be mailed to those interested on application.

The Berlin Iron Bridge Co., of East Berlin, Conn., is building a large warehouse in New York City for James Everard. The building will be 120 feet square, 12 stories high, with a steel frame and will be entirely fireproof. The Metropolitan Electric Company, at Reading, Pa., has placed the contract for its new power house with the Berlin Iron Bridge Company.

The Walker Manufacturing Company, Cleveland, O., closed the following contracts between March 1 and March 22, 1895: Burborn & Granger, No. 136 Liberty street, New York City, two 25-K. W. direct-coupled lighting generators; Union Depot Railroad Company, St. Louis, Mo., forty-one double car equipments, eighty-two 30 H.P. steel motors; Pittsburgh Traction Company, Pittsburgh, Pa., one double car equipment, two 30 H. P. steel motors; Pittsburgh, Crafton & Mansfield Passenger Railway Company, Pittsburgh, Pa., one double car equipment, two 50-H. P. steel motors; Federal Street and Pleasant Valley Passenger Railway Company, Pittsburgh, Pa., two double car equipments, four 30-H. P. steel motors; Suburban Rapid Transit Street Railway Company, Pittsburgh, Pa., one double car equipment, two 25-H. P. steel motors; Schuylkill Electric Railway Company, Pottsville, Pa., four double car equipments, eight 25-H. P. steel motors; Chicago City Railway Company, Chicago, Ill., forty-nine double car equipments, ninety-eight 25-H. P. steel motors; F. E. Snow, Receiver, Adrian City Electric Belt Railway Company, Adrian, Mich., one 60-K. W. belted generator and three single car equipments, 25 H.P. steel motors.

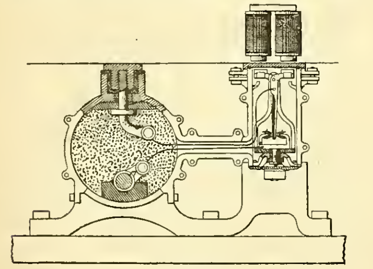
RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued March 19, 1895.

535,867. Brake For Railway-Cars; Ivan M. Skillman, Chicago, Ill. Filed April 30, 1894. This is the combination with an axle of a sleeve having the collar provided with beveled or ratchet teeth to engage simialrly formed teeth on an adjacent collar the first mentioned collar having the cut-away part provided on each side thereof with projections, a screw-threaded rod, having its bearings in projections and adapted to engage one of the teeth on the collar adjacent to the collar.

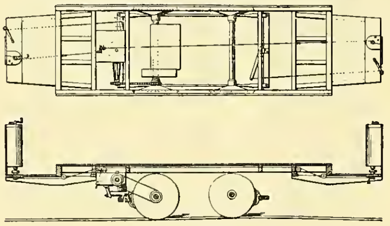
535,868. Railway-Car; John F. Stevenson, Lamoille, Ill. Filed May 28, 1894. The trucks are at each end and the frame work or support has a flat base which extends from truck to truck, the frame work tapering upward, and having a small flat top, level with the top of the wheels and midway between the trucks. A second supporting frame has a small flat base, about midway its length and a flat top equal in length to the bottom of car. The car rests upon the top, the upper support being somewhat greater from base to top than the lower one.

535,936. Conduit Electric Railway; Fred P. Bergh and Charles W. Tarbox, New York, N. Y., Assignors to David Calman, same place. Filed May 25, 1894. The contact shoe is carried by the car and running entirely within the conduit. The shoe is constructed in sections hinged together and adapted to swing laterally. A roller is mounted in a pivoted frame at each end of the shoe, arranged to project into the slot of the conduit to guide ths shoe around curves.



No. 535,993.

535,971. Insulated Trolley Section and Cross-over; Montraville M. Wood, Chicago, Ill., and Charles K. King, Mansfield, O., Assignors to the Ohio Brass Company, Mansfield, O. Filed July 13, 1894. This is the combination in a trolley insulating device of tongues to which the trolley wire is to be attached, plates rigid with each of the tongues, a slotted hollow tube projecting from each of the plates through which slot the trolley wire is to pass, a plug in the tube and a cap or the like by which the plug is forced against the wire, projecting lugs on the plate and a piece of insulating material having caps on each end provided with lugs adapted to fit in between the lugs on the plate and a bolt or the like passing through the lugs so as to hold the parts together.



No. 536,055.

535,993. Closed-Conduit Electric Railway; James F. McLaughlin, Philadelphia, Pa. Filed Oct. 23, 1894. The conduit is composed of sections joined end to end, and switch boxes are connected to the conduit by laterally extending necks, each switch box and its neck being coincident with and divided into two parts in the vertical plane of a conduit joint. (See illustration.)

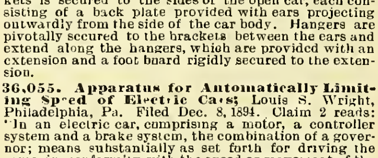
536,017. Alarm for Vehicles; John M. Christopher, Baltimore, Md. Filed March 10, 1894. A whistle is dependent from a vertically moving spring-held treadle combined with a fan or blower, which is put in operation as the treadle is depressed.

536,034. Convertible Car; Benjamin Lowenberg, Norfolk, Va. Filed May 19, 1891. In a car or similar vehicle there is a vertically swinging and inward horizontally sliding side wall, and means for swinging the wall and independent means for sliding it horizontally.

536,039. Open Railway Car; Donald K. McLeod, Boston, Mass. Filed April 5, 1894. A plurality of brackets is secured to the sides of the open car, each consisting of a back plate provided with ears projecting outwardly from the side of the car body. Hangers are pivotally secured to the brackets between the ears and extend along the hangers, which are provided with an extension and a foot board rigidly secured to the extension.

536,055. Apparatus for Automatically Limiting Speed of Electric Cars; Louis S. Wright, Philadelphia, Pa. Filed Dec. 8, 1894. Claim 2 reads: "In an electric car, comprising a motor, a controller system and a brake system, the combination of a governor; means substantially as set forth for driving the same in conformity with the speed or movement of the car; actuating mechanism, substantially as set forth, operatively connected with the brake and controller systems; means, substantially as set forth, for driving said actuating mechanism from the running of the car; an engaging device, operated by the governor and commanding the connection between the primary source of power for said actuating mechanism and the controller and brake systems; and a frictional connection located in the train of mechanism between said primary source of power and the controller brake systems." (See illustration.)

536,076. Collapsible Conduit for Electric Railway Conductors; Harry C. Grant, New York. Filed September 17, 1894. In the underground conduit there is a support on which a casing composed of elastic metal plates of semi-elliptic cross-section is mounted above the bottom of the conduit. There is an insulated main conductor within the casing and contacts are also carried by the casing, to be brought into electrical connection with the inclosed main conductor, by a passing car (see illustration).



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As the STREET RAILWAY GAZETTE is published 52 times a year, and is the only weekly publication devoted to Street Railway Interests, its value as an advertising medium will be apparent to Manufacturers and Dealers in Street Railway Apparatus and Supplies of every description. We will take pleasure in quoting rates for advertising space.

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Accidents on Massachusetts Railways.

The street railway report of the Massachusetts Railroad Commissioners, of which an installment appears in this issue, contains matter of the highest interest to street railway men. In point of accuracy and of care in preparation no similar official publication can compare with it excepting the annual report of the New York Railroad Commission. The matter of accidents and their prevention is treated in that part of the report printed this week. The record of the Massachusetts street railway companies is certainly excellent. The total number of accidents is 1,341,of which only 29 were fatalities—a decrease of 16 from the number of fatal accidents during 1893. During the same time the steam railroads of the State, by accidents of various kinds, caused the death of 232 persons, although they carried, 132,000,000 passengers less than the street railways. The former are credited, however, with an aggregate of miles traveled that is three times as great as that of the street railways. The total number of accidents on the steam railroads is stated to be 1,114 which is 227 less than those recorded against the street roads. This comparison is very far from fair. The steam roads report only accidents of a serious nature, while the street railway companies report injuries to persons of almost a trivial character. If the former had been as conscientious the showing would be very different.

Electric Railway Competition with Elevated Roads.

It is interesting to note the difference in the plans adopted by the steam railroad companies and the elevated railway companies to meet the growing competition of the electric lines. The former are determined to fight the competition energetically and aggressively; the latter, on the other hand, have adopted no sort of policy, unless it be one of pinching economy pursued on the theory that the electric railway competition cannot be met successfully. In pursuance of their enterprising policy, three of the great railroad companies, the Pennsylvania, the New York Central, and New York, New Haven & Hartford, are engaged at the present time in installing electric traction systems on certain of their branch lines. The Pennsylvania and Reading companies are also preparing to meet competition by radically improving their suburban service by the introduction of more frequent and more rapid trains and by the reduction of fares about one-half. The inactivity of the elevated companies stands out in striking contrast to the enterprising efforts of the steam roads. Rumors are circulated periodically that the former will introduce new methods in their business, but nothing seems to come of these reports. The Brooklyn elevated roads may be cited as good examples. They are suffering from losses of traffic, fully as serious as those of the steam roads, but nothing seems to be done to retain their business. As the traffic grows less, they endeavor to adjust their expenditures to diminished incomes by reducing operating expenses, or, in other words, by making the service poorer and therefore less popular. In these days of enterprise, such a policy is not likely to be lucrative. If these companies propose to retain their traffic and pay dividends, they must follow the course adopted by all business companies when they are threatened by serious competition; they must make their service more attractive by the introduction of improvements needed on all elevated lines. Only by following such a course can these companies expect a return of prosperity. The logical outcome of the present policy of inactivity is, as many of the officials admit, a receivership.

Stability of Street Railway Traffic.

It was stated by the President of a great street railway company during the summer of 1894, soon after the financial depression was felt, that street railway traffic might be regarded as the index of a city's prosperity or adversity. Travel on a street railway system fell off, he maintained, just in the proportion that the general business of a city suffered, and the passing of the panic would be indicated, he predicted, by the return of prosperity to street railways. Street railway companies were then suffering severely from losses in traffic and they were justified by their experience in complaining as loudly as most business corporations; but it was soon after observed that the business of the former commenced to improve much more quickly and satisfactorily than that of the other sufferers. This fact has become so apparent that the statement which has been quoted would now, without a doubt, be regarded by those whose opinion is of value, as incorrect and unfair to street railways considered as properties for the investment of capital. It has been found that the business of street railway companies is much more stable than was believed and is not subject to nearly as great fluctuations as that of the steam railroads, with which the street railways are so frequently compared. The best and the latest figures for making such a comparison are to be found in the last report of the Massachusetts Board of Railroad Commissioners. The difference in the effect of the panic on the two classes of properties in Massachusetts is very marked. In 1894 in that State, the passenger traffic of the steam roads decreased 8.64 per cent., and the net tonnage was reduced nearly twice as much. During the same time the volume of street railway travel increased in spite of the hard times 3.24 per cent. The gross earnings of the steam roads for the same year were reduced 9.60 per cent. while those of the street railway companies were increased 3.53 per cent. This is certainly a favorable showing for the street railway companies and must be highly gratifying to those interested in street railway securities. While the figures given relate solely to Massachusetts, similar results are to be found in most other States. In fact such results are to be expected as a consequence of the the character of the street railway business. A very large portion of the traffic of a street railway consists in the transportation of persons to and from their places of business; riding of this kind becomes a fixed habit and almost a necessity with a very large class of residents in cities, who consider it an essential of only less importance than food and raiment. To a quite extent, on the other hand, riding in railroad coaches is a luxury which may be dispensed with when the time comes for economy. Street railway companies are proving at the same time their ability to attract traffic from other railroads, so that both the regular steam lines and the elevated roads are suffering from losses of traffic due to this cause, and are demanding that the activity of the local surface lines shall be checked by the law-making power. Street railway lines, however, are growing in popularity and their patrons are not likely to allow the enactment of such hostile legislation as will seriously interfere with them. All the facts indeed, tend to prove the stability of street railway traffic and consequently the excellence of street railway investments; street railways as a class have stood the test of hard times so well that it is not surprising that first-class street railway securities are commending themselves to shrewd and conservative buyers

STREET RAILWAY LITIGATION IN CHICAGO.

The West and South Towns Street Railway Company, which is operating an electric railway on West Twenty-second street, in Chicago, was seriously delayed in the construction of its line by obstacles of various kinds, the most formidable of which were injunctions restraining it from entering upon certain property along its proposed route. The company has claimed that, while the restraining writs were nominally obtained by property owners, the real opponent of its street railway construction was the West Chicago Street Railway Company. The company has now brought suit to recover for $1,000,000 damages it alleges it sustained by reason of the action of the West Chicago Company. The suit is brought in the name of the Chicago General Street Railway Company which is the successor of the West and South Towns Street Railway Company. The defendants are the West Chicago Street Railroad Company, Charles T. Yerkes, president; John B. Parsons, general manager; the American Surety Company, of New York, and a number of property owners who instituted injunction proceedings against the West and South Towns Company.

The declaration recites that the defendants entered in a conspiracy " with the willful, unlawful and malicious purpose and intent, wrongfully and wickedly, to injure the business and property of the new company, to hinder and prevent the construction and operation of its railway, to prevent and stifle competition in the business and trade of carrying passengers; that in pursuance of such conspiracy" injunction suits were begun, "all of which," it is alleged, were brought at the instigation of the West Chicago Street Railroad Company.

The American Surety Company is brought into the affair because it signed the indemnity bonds to enable the property owners, in whose names the suits were brought, to prosecute them. The cost of these bonds, it is alleged, was paid by the West Chicago Company.

It is stated that in October, 1892, when the work of laying track on Twenty-second street was stopped by injunction, a half a million dollars in bonds had been issued and placed in the hands of a trustee for sale, $50,000 of which had been sold and the sale of $200,000 of the bonds had been contracted for, which, it is stated, might have been sold at par. The sale of the bonds, it is alleged, was prevented by the injunction, which resulted in a damage of $250,000. At the time of the injunctions negotiations were opened for the purchase of certain real estate, which transactions were prevented by injunctions and caused a damage of $20,000.

The company had contracted with the Siemens-Halske Electric company for the furnishing of electric power, which contract was of the value of $50,000, and the contract was annulled by reason of the injunctions, and the company became involved in a litigation which has caused a total loss of $15,000.

If it had not been for these injunctions, it is claimed, the road would have been in operation nearly two years before it was. At the time the injunctions were served negotiations were pending for the purchase of the Cicero and Proviso electric system, which negotiations were stopped, creating a further loss, it is alleged, of $150,000. The loss to the road by reason of being prevented from completion in time to get a chance at World's Fair business is put down at $183,000. The company says it can carry 35,000 people a day, which gives it a net earning capacity of $250,000 a year.

FATAL ACCIDENT AT JEANESVILLE, PA.

As the result of a panic on a car on the mountain tracks of the Lehigh Valley Traction Co. at Jeanesville, Pa., on March 30, four persons lost their lives and several were very seriously injured. According to all the accounts, as the car was proceeding down the grade, the brake chain broke and the motorman called out to the conductor to apply the brake from the rear platform. Before the latter was able to act, the passengers became alarmed and crowded him so that it was impossible for him to move the brake handle, or operate any of the safety devices with which the car was equipped. When he urged them to go within the car and allow him to apply the brake, they made preparations to jump from the car, which was now proceeding at a terrific rate: Three persons who jumped from the car were killed outright, and several other persons were injured in the same way. At the foot of the incline the car jumped the track and crashed into a telegraph pole. The front of the car was broken in, and one of the passengers who remained in the car was so seriously injured that death subsequently resulted. The motorman and conductor were only slightly injured. It seems to be the fact that the accident might have been prevented had the passengers not become panic-stricken, for it is stated that the car could have been held by the rear brake had the conductor been allowed to operate it.

ELEVATED RAILROAD COMPLAINTS OF ELECTRIC CAR SPEEDS.

Since electric cars have been in operation in Brooklyn the elevated railroad companies have lost a vast amount of business. The officials of the companies have maintained that the speed of the surface cars should be restricted—in fact, they have been extremely solicitous of the public safety, endangered, as they have asserted, by excessive trolley speeds. They have gone so far as to charge the city officials with bad faith in allowing surface cars to travel at such speed that the franchise of the elevated roads was depreciated in value. This claim appears in a suit which the Brooklyn Elevated Railroad Company has just brought against the Brooklyn Registrar of Arrears of Taxes. The suit is instituted to secure an injunction restraining the registrar from advertising the property of the company for sale for non-payment of the taxes of 1893. The company claims, among other things, that the City of Brooklyn granted to it a franchise to run its cars at a rate of speed in excess of six miles an hour and subsequently gave the right to the trolley companies to run their cars as fast as ten miles an hour.

This right of propulsion by the trolley, the company alleges, has been interpreted by the surface companies, without any objection on the part of the city, to mean an average of ten miles an hour, irrespective of stops to allow passengers to get on and off, thereby involving the exercise of a right by the trolley companies to proceed at a rate of speed which, under the rapid transit act of 1875, now embodied in the railroad law, was intended to be conferred only upon elevated or underground roads; and to obtain which right the Brooklyn elevated and its component companies were constrained at the time of the acquisition of their franchise to incorporate under the rapid transit act and build and operate roads at the expense of many millions of dollars. The plaintiff alleges that the extraordinary privileges granted to the trolley companies has largely increased the assessable value of the property for purposes of taxation, and have tended to proportionately diminish the gross and net revenue of the Brooklyn elevated. In fact, the latter, according to the complaint, has sustained irreparable damage by the depreciation of the value of its property and franchise.

The plaintiff also complains that the trolley companies, under the present law, are not taxed as real estate, although they exercise the same rights in respect to speed as the plaintiff does, while the elevated roads are taxed as real estate, as being an additional burden on the streets. The plaintiff recites that when the trolley went into operation the Brooklyn elevated had no floating debt, but it did have a surplus of $236,000. On January 1, 1895, it was in debt $362,000, beside the taxes of 1893 and 1894.

WELDED JOINTS IN ST. LOUIS.

Cast welded and electrically welded rail joints have been put to a severe test the past winter in St. Louis, as the thermometer indicated lower than zero weather for days at a time. The continuous rail stood the frigid atmosphere well, the fractures being few. In St. Louis there are many miles of both kinds of welded rails, and the observations made the past four months show that the contractions were not appreciable. Capt. Robert McCulloch, general manager of the Hamilton Syndicate System in St. Louis, made the experiment on the Baden and the Southwestern lines, says the St. Louis *Globe-Democrat*. He is so well satisfied with the performance of the continuous rail that the Citizens' railway tracks will be welded. That line was converted from a cable to an electric road last December. So far the old cable tracks have been used, which are now to be replaced by rails 60 feet in length, 7 inches high, and weighing 85 pounds to the yard. The rails are to be welded; they will rest on heavy ties which will be underlaid with rolled broken stone and concrete. The special work was taken in hand the past week, so that when the rails arrive all the switches, crossovers and crossings will be finished.

GRAND JURY PRESENTMENT ON ACCIDENTS.

The Kings County Grand Jury last week submitted to the court the following presentment concerning electric railway accidents:

One matter to which we would particularly call the attention of the honorable court relates to the many casualities occurring on our streets in connection with the operation of the trolley cars, resulting in serious physical injuries and often in death. This subject has been brought before us, not only by communications from citizens, but also by reports from coroners' juries, which have directed that the matter be laid before the grand jury for its action. In our consideration of these matters we have been advised by the district attorney that in the case presented to us there were no statutory provisions existing efficient for the criminal prosecution and punishment of those to whose carelessness the accidents are attributable. We have, therefore, not been able to find any indictments in connection with these matters, but it has seemed to us our duty to make some presentment to the court which should express our views of what would to some degree at least remedy the present condition of things. After a somewhat full examination into the matter we have concluded that the two questions which most nearly touched the subject of protection of the public from such accidents relate to the restriction of the speed of the cars and to the use of safety fenders. We are advised that so far as the speed is concerned a regulation has just been passed by the common council which, if enforced vigorously, will operate to restrict the speed of the cars within a reasonably safe limit. So far as the matter of the use of safety fenders is concerned we are advised that it will require legislative action of the state legislature to provide the law requiring the use by the companies of an efficient safety fender, because no such law yet exists upon the statute books. We are satisfied that if every car was provided with safety fenders then, under the limitations of speed referred to in the common council ordinance just passed, most of such accidents as have occurred would be avoided, and that even where accidents occur they would not be fatal in character. We understand that in other cities where fenders have been in use accidents have been subsequently prevented and that the fenders in those cities required to be used have simply been required to be constructed according to certain general features of safety. We consider that the legislature ought, without delay, to pass a law requiring the railroad companies in Brooklyn to use upon every car a safety fender constructed according to what experience in other cities has shown to be the features of safety. And that the act should contain provisions for the punishment of the officers of the companies who do not within a reasonable time, fixed in the act, provide for such fenders for the cars.

We would recommend that a copy of so much of this presentment as relates to the subject of the trolley cars be forthwith sent by the district attorney to every member of the assembly and senate from the County of Kings.

Brooklyn, N. Y.—Mayor Schieren has approved the ordinance fixing the speed of electric cars at 6 and 8 miles per hour.

ELECTRIC TRACTION ON THE PENNSYLVANIA ROAD.

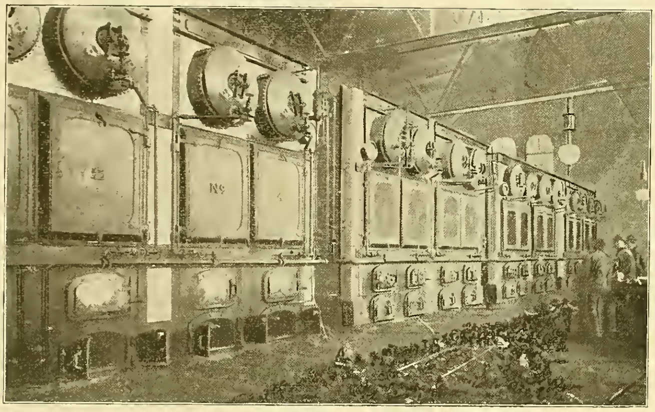
Preparations have been in progress for some little time for the installation of an electric traction system on the Burlington branch of the Amboy Division of the Pennsylvania Railroad. The construction will be of the best character. The track work and the overhead construction will be done by the company under the direction of its consulting engineer, F. W. Darlington. All the light rails are to be removed and the track will be laid with new 70-pound T-rails. The contracts for the power plant have just been awarded.

The generator, which will be of 250 K. W. capacity, will be furnished by the Westinghouse Electric and Manufacturing Company. This will be coupled direct to a Westinghouse engine. Steam will be furnished by a Climax boiler, constructed by the Clonbrock Steam Boiler Works, of Brooklyn, N. Y. The three motor cars which will be operated on the line will be built by the Jackson & Sharp Company, of Wilmington, Del. They will be combination cars, with the front compartment for baggage. Two of the cars will be equipped with two 75 H. P. electric motors, constructed by the Westinghouse Company. The third car will be equipped with four motors of 50 H. P. each. The motor cars will draw two or three coaches, as may be required for suburban ervice.

It is announced that the line, which is between six and seven miles in length, will probably be ready for electrical operation by the 1st of June. After that time steam locomotives drawing freight trains and through passenger trains will run over the line as usual, as the trolley cars will be employed for local service only.

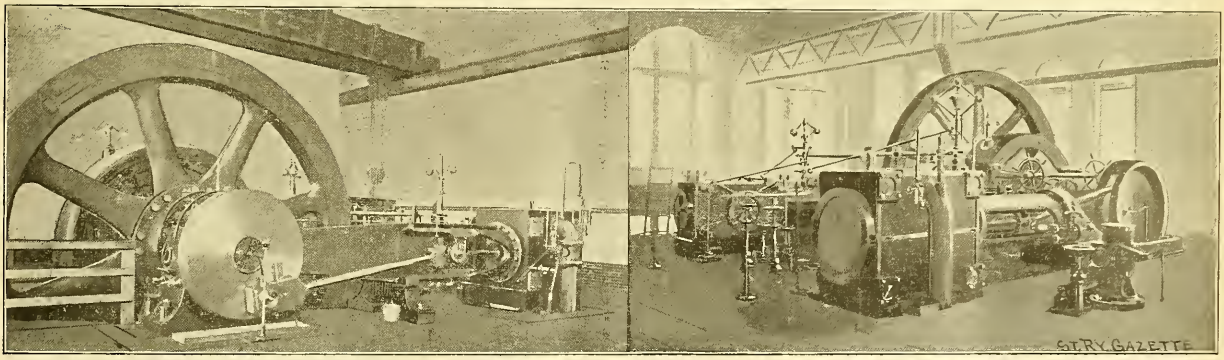
NEW POWER STATION IN NEWARK OF THE CONSOLIDATED TRACTION COMPANY.

The accompanying illustrations are interior and exterior views of the new power station of the Consolidated Traction Company of New Jersey, which operates one of the most important and extensive electric railway systems in the country, and which owns upwards of 160 miles of track in Jersey City, Newark, Orange and Elizabeth. The plant is located on the Passaic River between Stiles and Coal streets in Newark, and occupies a plot of ground 159 feet 11 inches × 190 feet 7 inches. The building is of brick with stone trimmings, and is one story in height with a monitor roof supported by iron trusses. The roof is constructed of Georgia pine, upon which is laid a layer of white pine. The wood is covered by asbestos and felt, above which are tar and gravel. The foundations are of concrete supported by piling.



BABCOCK & WILCOX BOILERS IN THE NEW STATION OF THE CONSOLIDATED TRACTION CO.

The engine room is located in the river side of the building and measures 96 × 150 feet. The present power equipment consists of three cross compound condensing Corliss engines of the Watts-Campbell type, with cylinder dimensions 26 and 48 inches by 48 inches stroke, and one cross compound engine of smaller capacity built by the E. P. Allis company. The cylinder dimensions of the Allis engine are 16 and 32 inches by 42 inches stroke. Each of the Watts-Campbell engines will be directly connected to a Westinghouse multipolar generator of 800 kilowatts capacity, while the smaller engine is connected to a generator of same type of 500 kilowatts capacity.



Watts-Campbell Engine.

Allis Engine.

NEW POWER STATION OF THE CONSOLIDATED TRACTION CO.

The plant will shortly be increased by the addition of two Watts-Campbell cross compound engines with cylinder dimensions of 36 and 62 inches by 60 inches stroke. Each of these engines will be directly connected to a multipolar generator of 1,500 kilowatts capacity.

The switch-board is located in the center of the west side of the room. The panels are of marbleized slate and are equipped with Weston and Westinghouse instruments. All the wiring and steam piping will be carried under the floor. The engine room is provided with two traveling cranes of 20 tons capacity each. An abundance of light and ventilation is furnished by large windows on three sides and by windows extending the entire length of the monitor roof. A dado of enameled brick extends around the base of the walls, and when completed the station will present a very attractive appearance.

The boiler room measures 113 feet 4 inches by 88 feet 10 inches, and will contain 16 Babcock & Wilcox boilers arranged in eight batteries of two each, each battery having a capacity of 500 H. P. The boilers are arranged on each side of the room, and with their enameled brick fronts present a very handsome appearance. The floor is constructed of brick arches, covered with eight inches of Portland cement. The boilers are furnished with the Butman rocking grates, and hoppers are provided from which the ashes are dumped directly into iron ash cars running on tracks in the basement.

Conover independent jet condensers are employed, and the condensing and boiler feed water is supplied by the Passaic River. Water for the boilers is pumped from the river into storage tanks of about 200,000 gallons aggregate capacity, which will be located on a part of ground between the station and the Pennsylvania Railroad. Hyatt filters, manufactured by the New York Filter Company, will be used for filtering the water before it is used.

The location of the station affords excellent facilities for receiving coal, which may be brought directly to the station by railroad or boat. Two large coal pockets of 3,000 tons' capacity each will be built over the water tanks, and a complete system of coal handling apparatus will be provided for delivering the coal to hoppers directly in front of the boilers.

The steam piping is so arranged that the liability of accident is reduced to a minimum. Each battery of boilers is connected by means of two 8-inch pipes with a 20-inch main extending through the center of the room. Steam is taken from this main by two 20-inch pipes and passes through two large separators, 7 feet high and 4 feet in diameter, before entering the engine room. From the separators the steam passes to a main extending through the center of the room between the engines. Branch pipes lead from the main to separators or reservoirs located directly under each engine.

Provision has been made by the arrangement of the valves and piping so that in case of accident to the high pressure cylinder steam can by taken through a reducing valve into the low pressure cylinder. The stack is one of the handsomest of its class. It is constructed of steel with brick lining and is 225 feet in height above the foundation. The brick lining ranges from 13½ inches in thickness at the bottom to 4½ at the top. The brick base is 50 feet in height and tapers from 18 feet in diameter at the bottom to 12 feet at the top. The stack was built by Riter & Conly of Pittsburgh, Pa.

Green economizers are employed, and the flues are so arranged that they may be cut out by means of dampers operated by hand wheels in the oil room above the economizers.

The plant will be equipped with a complete oiling system. From tanks in the oil room just referred to the oil will flow by gravity to all of the bearings, and the drip will pass to filters in the basement, and thence will be pumped back to the reservoir in the oil room.

This plant, when completed, will probably operate all the Newark lines, including the Newark and New York line, as far as the Hackensack river.

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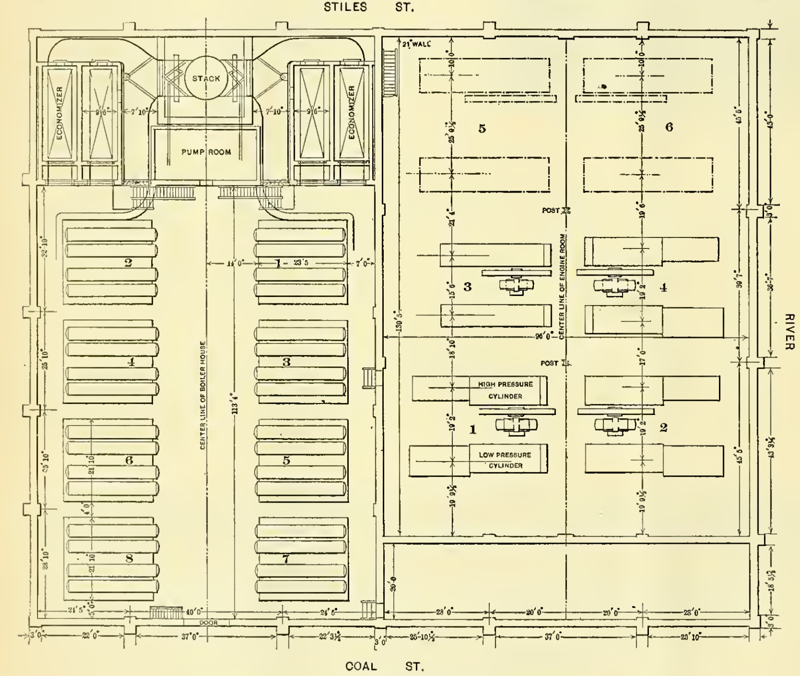
TROLLEY SYSTEM IN THE SOUTH.

A writer who is contributing to the New York *Sun* a series of articles entitled "Some Observations in the South," referred, in a recent contribution, to the wretchedness of country roads and to the need for reform in this respect. He continued :



PLAN OF THE NEW POWER STATION OF THE CONSOLIDATED TRACTION CO., NEWARK, N. J.

Perhaps the prospect of road improvement is not now so good as it would be were it not for the extensive introduction of the trolley system. Trolley cars are running in every considerable town, and the lines are oftentimes stretched far into the outlying districts, and eventually will be extended much further. Whatever may be said against the trolley in large and crowded towns, it is unquestionably an agent for the advancement of civilization in the country of inestimable value ; and the use now made of it there is only the beginning of the service it is destined to render in the development of the agricultural regions. The electricity which furnishes its motor is generated by water power at a marvellously cheap rate of expense, and once the lines are laid down they can be run at a cos so trifling that their extension in all directions seems to be inevitable both for the purpose o f transporting passengers and for conveying freight. In Western North Carolina such a road through the rich tobacco-growing country is protected for the special service of the planters, and generally may be made useful and profitable in affording facilities for rapid and cheap transportation in districts removed from steam railways, from which now the agri cultural products must be carted at great labor and expense and much loss of valuable time. If it be so employed it will assist importantly in opening up new regions to cultivation, and it will help to lessen the expenses of the farmer generally, and thus enable him to sustain himself in a period of declining prices for his products. This development of the trolley system or of the use of electricity as a motor is manifestly in its very beginning only, and as time goes on it will be carried to lengths that will change the whole face of agriculture. It already has had the consequence of reducing notably the number of horses employed in the villages, the bicycle also assisting to the same end. With the roads as heavy as they are now, riding in a trolley is a positive luxury. Where the best and strongest of teams can move only slowly and laboriously through the clinging sand, the trolley car runs along at 10, 12 or even 15 miles an hour, up hill and down hill, with tireless energy and complete ease. Around about Asheville and western North Carolina, where the country is hilly, these lines are laid in every direction, even up the sides of spurs of the Blue Mountains, and in a few minutes a journey of three, five and six miles is accomplished where animal traction would consume from a half to a full hour.

It is obvious, therefore, that the use of electricity as a means of locomotion and the cheapening of it will bring about very radical changes in country life. It will relieve the lonesomeness and monotony of the isolation of farming regions from which people escape to the towns in order to obtain the social friction essential to enjoyment, and even to moral health; for it will bring the detached farmhouses into close connection with town and village activity, and give opportunity for introducing variety into many now stagnant towns. Here in the south especially, this new development will tend to transform social conditions which have existed since colonial days,and it will thus pave the way for the increase of the population and the utilization of the untouched natural resources in which this region is so incomparably rich. Such a change must occur before the ambitious men who are now seeking to build up a new South can obtain their desire. The climate of nearly all the South is agreeable for white people generally, and in the central South, more especially in the higher regions of the interior, it is in all respects inviting. The obstacles to agriculture are far less than in parts of the West favored by immigrants, an abundance of good farming land is obtainable at low prices, and the opportunities for successful mining are numerous, but at present the diversification of employment is not great enough and the facilities for communication are not good enough, to say nothing of the somewhat narrow and provincial social tone still remaining in some districts, to attract the large immigration desired. The indignity which free white labor suffered because of negro slavery is passing away. At Mr. George Vanderbilt's place at Biltmore white men and negroes work together harmoniously : but generally the price of negro labor, much lower than the market rate for labor with us, acts as a deterrent to the immigration of workingmen.

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STABILITY OF STREET RAILWAY TRAFFIC.*

An inquiry which merits, and doubtless will receive, careful attention in the existing period of depression is as to the effect of such depression upon the traffic of the street railways. We all know that the business of the steam roads has fallen off enormously, but these carry freight as well as passengers, and the character of their traffic, as well as the conditions under which it is conducted, is totally different from that of the street railways. The question then is a pertinent one, how do bad times affect such roads? Can we regard their traffic as being reasonably stable, or should we be prepared to see considerable fluctuations in it under the changes in the trade situation, even though the fluctuations may not be as extreme as in the case of the steam roads? The great extension of the street railway system under the use of the electric and cable method of traction, and the enormous amount of capital invested in it, make the question an important as well as an interesting one.

A difficulty which confronts the investigator at the outset is that past experience offers very little guide. The new methods of propulsion have revolutionized surface railway business. Formerly street railways were confined in great measure to the cities or the larger towns. Now the "trolley" runs away out into the remoter suburbs, and thus travel over the surface lines is no longer merely or chiefly urban, but suburban as well. Some of the increase in traffic which has resulted from the enlargement and multiplication of the street roads has been at the expense of the older method of transit—that is, at the expense of the steam railways—but the trolley and the cable lines have also created a great deal of entirely new traffic. In fact, no feature connected with the recent growth of the new system of transit has been so striking as the wonderful expansion in the business of the lines which has followed from the change. Here in New York and Brooklyn the substitution of cable traction and electricity for horses as motive power has been in nearly every case attended by a very great increase in travel over the lines making the change.

But of course the fact that the new system is superior to and possesses many advantages over the old is self-evident, and therefore not open to discussion. The point of importance, as affecting the investments in these properties, is whether a traffic having been built up, it is likely to suffer any marked diminution as a result of serious business depression. The answer is by no means as simple as might appear from a superficial consideration of the the matter. Much of the traffic of the street railways, particularly in the larger cities, is part of the daily routine of life, and goes on whether business is good or bad. It is probably true too that the proportion of such traffic on these lines is larger than that on the steam roads. To the extent that this is so of course the factor of stability is greater than in the other case. It will be understood that stability in this sense does not mean that the volume of such traffic remains stationary year after year. It simply implies that whatever changes take place are in the one direction—that is, the traffic does not fall off, but it increases with the growth of the locality served and the growth of population.

There is, however, with the street railways as with the steam roads a variable quantity, only as already said, it may form a smaller portion of the whole. A good many work people patronize these lines going to and from their daily work. This being so, it is obvious when large numbers of wage-earners are out of employment, and consequently are not obliged to use the roads, the traffic from that source must suffer. It is evident, too, that aside from those who are without work there will be others who are only partly employed or have had their wages reduced, and having thus a diminished income are forced to economize. Some of these may conclude to walk instead of ride, or they may find it desirable to change their place of residence and move nearer to the point of their employment. Again, in time of depression, not merely work people, but practically all classes of persons find their incomes curtailed, and car fares are saved wherever possible. For short distances a man will walk, and his wife and daughters while shopping will do the same—all of which is a loss to the street railways.

It is thus clear that there are various ways in which the traffic of the street railways may diminish in a period of depression. But thus far certainly these roads—speaking of them as a whole—have done remarkably well. Through the change in their motive power which so many of them

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*Abstract of an article in Street Railway Supplement of the *Commercial and Financial Chronicle*.

have made during the last few years they have been able to add so very largely to their traffic that the effects of the depression in trade do not appear to any great extent in the results of their operations. In this city and Brooklyn the cable and the trolley have taken away much traffic from the elevated railroads. The business of these latter roads is of course closely analagous to that of the street roads, and persons not familiar with the actual facts of the case might think that the great losses in traffic which these roads have shown in their monthly and quarterly returns simply reflect the prevailing industrial prostration. A few years ago no company was considered to have such an assured traffic and income as the Manhattan Elevated. It was a subject of common remark at the time that while Western and Southern roads might suffer from poor crops, low rates, or bad trade, the Manhattan Elevated had a traffic which could always be depended on, and which would remain unaffected by any disturbing circumstances and conditions. But in the company's latest fiscal year—the year to June 30, 1894—the gross earnings of the road fell off almost a million dollars, and the number of passengers carried diminished $18\frac{5}{8}$ millions.

This falling off in some measure doubtless is due to business depression, but in the main the reason for it is to be found in other causes. The Manhattan Elevated has in some respects pursued a short-sighted policy, whereas the surface street roads have on the contrary pursued a very enlightened policy. They have in several instances replaced the horse-car lines by costly cable roads, and they have inaugurated an extensive system of transfers, whereby passengers are given the privilege of passing over various connecting and intersecting roads for a single fare. As a consequence the elevated road has lost passengers, while the surface roads have gained them. Perhaps as good an illustration of this as any that could be furnished is found in the return which the company has recently filed with the Railroad Commissioners at Albany for the quarter ending Dec. 31, 1894, showing a loss in gross revenues as compared with the corresponding quarter of 1893 of $210,441. This return was published in the *Chronicle* of Feb. 16, page 302. In the same issue on the next page (page 303) we also give the return of the Third Avenue (street) Railroad, showing gross of $596,752 in the quarter in 1894, against $377,292 in the quarter in 1893, an increase of $210,460. Thus there is an almost exact correspondence between the loss on the Manhattan Elevated and the gain on the Third Avenue road. To complete the parallel it only needs to be said that the Third Avenue Railroad follows the Third Avenue line of the Elevated its entire length, and that the former is now a cable road where before it was a horse-car line.

So also in the case of the elevated roads in Brooklyn. Business depression has hurt them of course, but the competition of the surface roads, which are now nearly all trolley lines, has hurt them still more. This appears very clearly from a recently published statement of the traffic on both the elevated and the surface roads for the year ending June 30, 1894, as compared with the year ending June 30, 1893. In this period the number of passengers carried by the elevated roads (the Brooklyn Elevated and the Kings County) fell off nearly eight millions (7,959,562), but in the same time the number carried by the electric roads increased 5,268,131, leaving a net loss in the grand total of only 2,691.431, or less than $1\frac{1}{2}$ per cent. The elevated roads reported continuous losses in gross receipts up to the time of the strike on the electric roads a few weeks ago, when their traffic at once increased almost 100 per cent; and though the strike has now terminated the returns still show handsome gains.

Another consideration should not be lost sight of as affecting the traffic of the street railways under the new form of motive power. Not only have these roads changed their mode of traction, but the character of their traffic has also in some measure been changed. The trolley cars and the cable cars form a much pleasanter conveyance than the horse cars—they are cleaner and healthier, and there are no offensive effluvia such as are frequently connected with the horse car service. Besides this, they furnish a much quicker means of transit. During the summer months open cars are run, and on the long lines into the suburbs, through an open country, a trip at that time is really delightful. The scenery is usually attractive, and the speed of the cars produces a strong current which in the hot days is both refreshing and invigorating. It has become the custom, therefore—at least in this part of the country—to use the cars in the hot period for pleasure and recreation. The fare as a rule is so low as to place this means of enjoyment within the reach of the poorest.

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METROPOLITAN TRACTION COMPANY OF NEW YORK INDICTED.

The Grand Jury has indicted the Metropolitan Traction Company of New York City for manslaughter in the second degree. It is charged in the indictment that the company was responsible for the death of Mrs. Elizabeth H. Andrews, at Broadway and Twenty-first street, on Feb. 27. The complaint was made by the son of the victim of the accident. The directors of the company were summoned to appear in the Court of General Sessions to answer to the indictment. In the event of conviction, a fine, not to exceed $5,000, can be imposed on the corporation.

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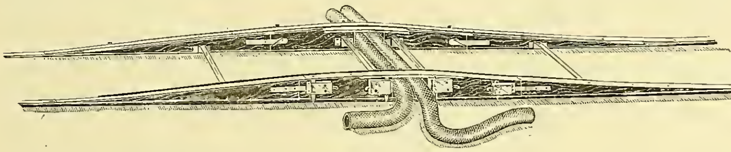
PORTABLE HOSE BRIDGE.

The fire hose crossing which is illustrated in the accompanying cut is designed to prevent the delays, annoying and often expensive to both passengers and companies, that are caused by fire hose stretched across the street railway tracks. The hose bridge is 16 feet in length, each side being composed of three sections which may be quickly and rigidly connected by a patent clasp. Braces keep the sides firmly in place, while patent ratchet spikes, held firmly by springs, hold the parts to the ground and rail. The parts are all made of the best and heaviest materials, and will carry the heaviest motor cars and trailers easily. The bridges will fit any kind of rail and are made for any gauge. The bridges can be placed in position by one man inside of three minutes, and can be carried to the scene of a fire either in a car or the "hurry-up wagon." Two lines of the largest fire hose made can be used through the bridge. The connection at each end with the rail is so perfect that the rise of a car in going over the bridge is so gradual and slight as to be hardly perceptible. These bridges are in use in Detroit and other cities. They are manufactured by the Portable Hose Bridge Company of Detroit.



PORTABLE HOSE BRIDGE.

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CONTRACTS AWARDED IN NEW ORLEANS.

The St. Charles Street Railway Company and the Orleans Railway Company, of New Orleans, La., have been for some time considering the bids for the electrical equipment of their roads, and contracts were awarded for the apparatus on March 31. The St. Charles Company has awarded the contract for its electrical generators to the Walker Manufacturing Company, of Cleveland. The generators will be directly connected to Hamilton-Corliss engines, for which the contract has been awarded to Hooven, Owens and Rentschler of Hamilton, O. The cars will be built by the Pullman Company, of Chicago, and will be mounted on trucks made by the McGuire Manufacturing Company, of the same city. The motors, which will be of 30 horse power each, will be furnished by the Walker Company. The work on the road is already in progress, and a considerable part of the track has already been laid. The power house will be built in the Third District near the Southern Pacific Railroad depot. The structure will be built of brick, and will contain the latest improvements.

The directors of the Orleans Railway Company awarded the contracts for generators and motors to the General Electric Company. The machines will be direct-connected to Reynolds-Corliss tandem compound engines, made by the E. P. Allis Company, of Milwaukee, Wis. The boilers will be furnished by the Heine Safety Boiler Company, of St. Louis. The cars will be mounted on Lord Baltimore trucks, furnished by the Baltimore Car Wheel Company, of Baltimore, Md. The Johnson Company, of Johnstown, Pa., will furnish the girder rails to be laid, and all the overhead construction will be done by the Creaghead Engineering Company, of Cincinnati, O.

For months the representatives of the several companies interested in the award of the contracts have been in New Orleans working industriously to capture the orders for apparatus. After the fight was over those who had been defeated accepted the result good-naturedly, and it was decided to signalize the end of the long period of monotonous waiting by holding a dinner at the Cosmopolitan Hotel. The dinner proved to be most enjoyable, and a number of informal speeches, referring to the events that had occurred during the long wait for the contracts, were made. Among those who were present were the following: S. J. Wick, S. W. Trawick, W. Y. West, J. A. Hanna, L. M. Pettipan, J. P. Baker, J. H. Vail, C. T. Henry, E. Peckham, E. W. Kingston, John Dick, S. E. Flint, E. W. Tucker, J. R. Gordon, Charles H. Whitaker, Colonel J. M. Atkinson, G. R. Scrugham, T. E. K. King and A. F. Giles.

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MASSACHUSETTS STREET RAILWAY STATISTICS.[*]

Part II.

ACCIDENTS.

The whole number of persons injured in connection with street railway operation, as reported by the companies for the year ending Sept. 30, 1894, was 1,341, of whom 29 received fatal injuries and 1,312 injuries not fatal.

The number of passengers injured was 704, of whom 6 were injured fatally. Most of the accidents to the passengers occurred as they were getting on or off the cars.

The injuries to employees were 58 in all, of which 3 were fatal. The number of injuries to travelers and others on the street was 579, of which 20 were fatal.

Of the whole number, 1,341 injured, at least 65 were children. The reports do not, in some cases, indicate whether the person injured was a child or an adult, and it has been assumed, in such cases, that the person was an adult. Of the 65 children injured, 6 were killed.

One in 313,159 of the passengers carried was injured, and only one in 36,744,016 was killed; street cars were run on the average 63,425 miles without injuring, and 1,836,149 miles without killing, any traveler or other person on the street; and that on the average 3,477 round trips were run without injuring, and 160,786 round trips without killing, any passenger, employee, traveler or other person.

It will be seen that the fatal accidents were 16 less the last year than in 1893; and this reduction appears to have been wholly in the number of children killed. The number of travelers and others on the street who were fatally injured was 18 less than the previous year. The number of this class of persons killed on the West End lines the last year was 10, as against 17 in 1893. There seems to be some ground for believing that the casualties to persons on the street, from electric cars, have been diminishing in number, and certainly in proportion to the increase in the number of cars run. Several reasons for this may be assigned. Electric cars were at first an unfamiliar source of danger, and people have come to understand the peril better, and to be more wary in avoiding it. Again, the mechanism for handling and controlling electric cars is more perfect, and motormen have become more experienced and skillful in its use. It is also to be presumed that the protection furnished by fenders has been the means of preventing serious and fatal accidents.

The large apparent increase in the number of non-fatal accidents in 1894, as shown in the foregoing table, is explained by the fact that a large number of minor injuries has been reported the last year, particularly by the West End company, which it has not been the custom heretofore to report. Injuries range all the way from a fatal hurt to a bruise or scratch. It is not easy to draw the exact line between injuries which should, and which should not, be included in the list reported to the board. It may be said in general terms, that not only the fatal and severe injuries, but those which are less serious, if not so slight as to be trivial, should be included in the report. The West End company, after conference with the board, has reported a large number of injuries of the latter class, which mainly accounts for the increase of non-fatal accidents shown in the table.

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[*] Abstract of Part of the Report of the Massachusetts Railroad Commissioners.

Since 1885 the number of employers of street railway companies has increased from 4,103 to 7,451 in 1895. During the same period the number of cars has increased from 2,114 to 4,058. The number of horses reached a maximum in 1887, when 11,874 were in service. The number decreased to 2,014 in 1894. The number of electric motors in use in 1894 was 3,905. This was an increase of 1883 over the preceding year. Statistics in regard to motors were not reported prior to 1893.

In 1888, before the use of electric power, 11,391 horses drew, in the course of the year, 134,478,319 passengers, or at the rate of 11,806 passengers per horse. The last year 2,014 horses and 3,906 motors moved 220,464,099 passengers. Assuming that each horse did the same work as in 1888, the motors must have moved 196,686,815 passengers, or at the rate of 50,355 passengers per motor—indicating that a motor does the effective work of about 4¼ horses.

FENDERS.

The board mentions that it was instructed by the Legislature to investigate the matter of fenders, and states that in accordance with its request 60 fenders were submitted for its consideration. It is stated that Prof. George F. Swain, of the Massachusetts Institute of Technology, assisted the Board in its investigation of fenders, and he submitted an extensive report on the subject, which is as follows:

"I beg leave to submit the following report with regard to fenders for electric street cars, together with the results of the tests which have been made in the presence of the Board at various times during the past two or three months. Before discussing the fenders presented to the Board, or giving the conclusions that may be arrived at concerning them, your attention is called to the following summary of what has previously been done, here and in other places, with regard to electric car fenders.

"*Legislation in Massachusetts.*—Chapter 364 of the Acts of 1890 provided that 'Street railway companies operating cars propelled by any motive power other than horses, shall equip their cars with such fenders and guards as may be required by the Board of Railroad Commissioners; and said Board shall have power from time to time to modify or increase such appliances.' Upon the passage of that act, the Board made an investigation of the subject, the results of which are given in its Twenty-second Annual Report (January, 1891), at pages 35–37 and 65–94.

"In the report which I made to your Board at that time, the principles governing the action of fenders, and the requisites which a successful fender should fulfill, were discussed in the light of the experiments which had been made up to that time. The experiments in connection with that investigation, which were carried on with 12 different kinds of fenders, and which were 94 in number, were the first extensive experiments that, so far as I know, had anywhere been made on this subject. Electric cars had at that time not been long in use, and the necessity for fenders was just beginning to be felt. In most of the cities where electric lines were operated, the fenders in use consisted simply of the straight or V-shaped wooden guards or pilots furnished by the makers of trucks. In a few instances, however—as, for instance in Cleveland, O.—platforms in front of the cars, or other similar devices, had been employed for the more efficient protection of persons who might be run into.

"The conclusions which I arrived at in that report were, briefly, that the best form of fender should consist of two parts:

"*First*, a front platform, 15 to 18 inches from the rails, or far enough above the ground to pass over without injuring a person lying flat, but which would afford a platform upon which a standing person could step, or upon which he would be thrown, if run into by an electric car; and

"*Second*, some form of fender or wheel-guard attached to the truck, to save a person lying on the track from getting under the wheels.

"It seemed at that time that the best form of fender to be attached to the truck was a fixed fender, brought as close to the track as possible, with a continuous thick strip of rubber along its lower edge coming down still closer to the rails.

"In its report upon this subject, the Board made the following statement:

> It is not difficult to devise a fender which shall work satisfactorily on a double-truck car, the body of which does not oscillate, and which is run on a track where the space between the rails is on a level with or nearly on a level with the top of the rails, and is perfectly smooth and free from ridges or depressions. Such conditions, however, do not prevail. Generally the cars are single-truck cars, and the bodies oscillate so that a fixed fender attached to the end of the car, and six inches above the top of the rail when the car is at rest, might, when the car is in motion, be raised so as to be a foot above the top of the rails, or be depressed so as to strike the ground. Then, again, the road-bed between the rails, as it is actually found, is uneven. In some cases its general level is above the top of the rails, and in other cases several inches below the top of the rails. In some cases there are ridges in it, and in other cases depressions. Outside of our cities, where the road-bed is not paved between the rails, such road-bed is generally considerably below the level of the top of the rails; while at street crossings and private entrances the road-bed between the rails is on a level with the top of the rails. The difficulty of devising a fender which shall meet all these differing conditions is apparent; and, so far as the Board has been able to discover, no such fender has been or can be devised. The Legislature, therefore, imposed upon the Board a task which it cannot accomplish. If the Board could prescribe the kind of cars to be used and the nature of the roadway between the rails, then it could prescribe an efficient fender. The city or town authorities control the roadway. The railway companies determine for themselves what kind of cars they will use. While the Board can prescribe a fender which shall be better than nothing, even on an oscillating car and on an uneven road-bed, still, none has yet been suggested which has seemed to the Board to give reasonable assurance of safety under existing conditions. If the Board fails to prescribe the form of fender to be used, then the street railway companies may, by virtue of the act, be relieved from the obligation to put on any fenders at all, and, in case of an accident, may be able to hold up the act as a shield against liability for damages; while, on the other hand, if the Board prescribes a form of fender to be used, no matter how inefficient such fender may be rendered by defects of cars or of roadway, the companies can also, in case of accident, plead that they have applied the fender prescribed by the Board under the provisions of the act, and that they are therefore relieved from all responsibility. Either of these results would be equally unsatisfactory and unfortunate. An electric car weighs twice as much as a horse car of the same size, while the new 25-ft. double-truck box cars of the West End Street Railway Company weigh eight tons, or three times as much as the ordinary horse car. The maximum rate of speed of an electric car is twice as great as that of a horse car, and, as electric power is developed, the attainable speed will be increased. On the horse cars the horses serve as a fender, projecting ten feet in front of the dasher. A person struck by them stands a good chance of being thrown clear of the rails, or of saving himself by catching hold of the harness. An efficient fender on electric cars is a public necessity. The act of last year (Statutes 1890, chapter 364) should be amended so that the responsibility of procuring or devising such a fender shall rest, where it belongs, upon the street railway companies.

"In compliance with the opinion of the Board expressed as above, the Legislature of 1891 repealed the act of 1890, but without substituting anything in its place.

"The subject of fenders still continued, however, to occupy the minds of railway managers, and of members of the city governments, as well as of the public.

"The railway companies were deterred from taking any active steps in the matter by the fear that, whatever fender they might adopt and apply to their cars, the city governments might shortly afterward require them to remove it and to replace it with some other fender. The difficulties in the way of devising a fender which should be satisfactory under all conditions, and which it would be practicable to operate, were fully realized by the railway companies, though frequently forgotten by the public and by boards of aldermen. The companies realized that no fender could be depended upon at all times and under all conditions. They feared that, whatever form of fender they might adopt, the occurrence of some accident might very soon raise an ill-advised and unreasonable popular cry against it; and they naturally desired to have a form of fender prescribed by some outside authority so that they might be relieved from responsibility in the matter.

"The example of the Railroad Commissioners in declining to be responsible for any particular form of fender, seemed also to be followed by all other constituted authorities whose function it might have been to act in the matter. No form of fender was prescribed by anybody.

"*Action of the West End Street Railway Company.*—Realizing that something ought to be done without delay, the West End Street Railway Company in 1892 appointed a commission of three members, of which I had the honor to be one, 'to investigate the subject, and to recommend a form of fender to be used' by that company.

"This commission made a report dated Oct. 3, 1892. The form of fender which it recommended was in substance the same which I had recommended to your Board in the report of 1891, although in detail it was somewhat different. It consisted—

"*First*, of a platform in front, essentially the same as previously described, but arranged so that it could be slid underneath the car when not in use. The commission also recommended that there should be an elastic buffer in front of the dash-board, the meshes of which should be large enough to enable a person to seize it with his hands, and which should be so elastic as to prevent injury to a person by striking against the dash-board or buffer.

"*Second*, of a wheel-guard attached to the truck, to prevent persons lying on the ground from getting under the wheels. This wheel-guard was different in form from that which I had previously recommended, and consisted of a straight piece of plank shod with rubber, extending across the track in front of the wheels, attached to a movable arm connected with the brake shaft in such a manner that when the brake was applied the fender would be forced down close to the track, although normally it ran at a distance of about three and one-half inches above the top of the rail.

"The front platform recommended in the report of this commission was soon applied to all the cars of the West End Company, and has since been applied to the cars of the Lynn & Boston and the Springfield companies. The wheel-guard, however, has never been applied.

"*Experience with Fenders in Massachusetts.*—In connection with this investigation, inquiry has been made of the various railway companies operating electric cars in this State, with regard to their experience with fenders. Little information of any value, however, has been received, except from a few of the larger companies. The only companies using fenders to any considerable extent appear to be the three just above named

"The information received from the West End company is of much interest and value in this connennection. This company, as above stated, applied to all of its cars, in the summer of 1892, the front platform, or Cleveland fender, sometimes called the Pfingst fender, which is familiar to all who are in the habit of using street cars in Boston. Statistics furnished by the company show that from Oct. 2, 1892, to Dec. 3, 1894, inclusive, 189 persons were in collision with cars provided with this fender. Of this number 161, or 85 per cent., either escaped unhurt or sustained very slight injuries; 23, or 12 per ceut., sustained serious injuries; and 5, or not quite 3 per cent. were either killed or fatally injured. This is a remarkable proof of the efficiency of this fender. Inasmuch as the cars of the West End company are provided with no wheel guards; but only with this front-platform fender, these figures show not only that the great majority of persons are struck while standing up, but that they are safely caught on this fender. If the dash-board of the car had been protected by a netting, the slight injuries received in some cases from contact with the dasher or bunter of the car would have been prevented. If a wheel-guard had been added beneath the car, a large proportion of the 15 per cent. of cases of death or serious injury would very likely have been avoided. It is not to be expected, however, that any fender will avail under all circumstances to prevent either serious injury or death.

"*Action in Other States and Cities.*—No action has been taken or systematic investigations carried on with reference to the fender question in this State, subsequently to the report of the West End Commission, until the recent experiments made before your Board. In other States, however, the question has continued to attract attention, and has led to municipal regulation in several cities, especially during the past year. I am doubtless not fully informed with regard to everything which has been done in all parts of the country. The following facts, however, may be of interest:

"In Newark, N. J., an ordinance was passed by the city government July 26, 1894, requiring all cars to be equipped before Nov. 1, 1894, with fenders of the most approved pattern, and so attached to the car as best to protect from injury persons and vehicles using the streets or riding on the said cars. This ordinance has been complied with by the railway companies, and all the cars in that city are now equipped with fenders.

"It will be noticed that the ordinance neither prescribes any specific form of fender, nor does it state any conditions which the fenders must fulfil; but leaves the choice entirely to the railway companies. Three different fenders are in use; the Darrach (No. 19), the Consolidated (No. 31), and a third fender, known as the Union Safety fender, which was not submitted to your Board. The greater proportion of the cars carry the Consolidated fender, which consists of a buffer in front of the dashboard, with a platform in front of the car, which can be dropped to the ground by the motorman in case of danger. The Darrach fender consists of an elastic front platform, together with a wheel-guard beneath the car, which can be dropped to the ground by the motorman or by raising the front platform. The Union Safety fender somewhat resembles the Consolidated.

"In Philadelphia, some forty or fifty different fenders have been tested within the past six months; and the President of the Philadelphia Traction Company informs me that as yet he has not found one that will answer the purpose. Further tests are soon to be instituted.

"In Washington, various fenders have been tested very recently under the direction of the engineer commissioner of the District of Columbia, Capt. Charles F. Powell, U. S. A. I am informed that the commissioners expect soon to issue a regulation adopting the Blakistone front fender and wheel-guard, and also the Brightwood wheel-guard and the Smith wheel-guard. The Blakistone fender (No. 59) was devised by the president of the Central Railway Company, of Baltimore, and has been authorized in that city. The Smith wheel-guard (No. 60) is manufactured by the Automatic Car Fender Company, of Washington. The

Brightwood fender is one devised by the superintendent of the Brightwood Railway Company of the same city.

"In Baltimore, an elaborate investigation of the subject was carried on during the past year by a commission consisting of the mayor, the city registrar and the city commissioner. The report of the engineer to this commission, Mr. Mendes Cohen, is a valuable document. It recommends, in substance, the same combination recommended in my report of 1890, and by the West End commission, namely, a front fender to catch persons standing, and a wheel-guard or fender underneath the car for the protection of persons lying or thrown down. Mr. Cohen did not specifically recommend any particular form of fender, but mentioned several front fenders and several wheel-guards which he considered reasonably satisfactory. No fender was found so mechanically complete and perfect that it could be recommended entirely; and it was deemed better to lay down the principles which should guide in the selection of a fender, thus leaving the burden of responsibility with the railway companies, and at the same time avoiding the creation of a monopoly in one fender, when in fact there might be several between which there was little to choose."

Mr. Cohen therefore stated the requirements to be fulfilled, in the following language:

> It is required that the front surface of the car, striking a standing human being, shall be so arranged as to afford a reasonable prospect of saving the person from being dashed to the ground; and further, so arranged that it shall do the least possible damage by its own impact; and further, if it fails to do the duty expected of it, and the person does fall to the ground, or is already lying there, that it shall be so devised as to pass over him without causing further injury; and that there shall also be on each car a suitably arranged *wheel-guard*, preferably of angular or "pilot" form, which shall be automatically brought in close contact with the street and rails, in order to prevent the crushing of the victim whom the front device has failed to save.

Subsequently to Mr. Cohen's report an ordinance was passed by the Baltimore City Council requiring the use of fenders.

(*To be continued.*)

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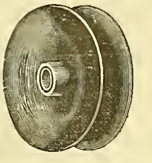
ALUMINUM BRONZE TROLLEY WHEEL.

The Fiberite company, through its agents, is introducing "a high-priced trolley wheel," illustrated herewith. The annoyance of having to change the trolley wheel at frequent intervals led to a request from some of the leading companies for a wheel that would give a longer life and at the same time would be of such material as to save the wire from unnecessary wear. Experiments were made by Mr. Medbery, of the Fiberite company, of Mechanicville, N. Y., with the result a wheel has been produced so satisfactory in every way that it has been adopted by many roads throughout the country. It is claimed by the Fiberite company that a trial will convince the most skeptical of the economy of using this wheel.



Aluminum Bronze Trolley Wheel.

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BALDWIN LOCOMOTIVE WORKS TO MANUFACTURE ELECTRIC CAR TRUCKS.

The proprietors of the Baldwin Locomotive Works of Philadelphia, Pa., have decided to add a new department to their plant for the manufacture of trucks for electric cars. The company is now constructing 32 trucks to be used under the cars on the Nantasket Beach line of the New York, New Haven & Hartford Railroad Company, now being equipped for electrical operation. The double trucks, except for an arrangement for the holding of electric motors, are, in most respects, like the ordinary steam railroad truck. Each truck is to support two motors of 100 H. P. each. The wheels are of wrought iron with steel tires, and are 36 inches in diameter. The motors are manufactured by the General Electric Company, and the cars will be built by the Barney & Smith Company, of Dayton, O.

THE LEGAL ASPECTS OF ELECTROLYSIS.*

BY HENRY C. TOWNSEND.

It is, at the present time, a well-settled fact that a continuing and serious damage is done to buried gas and water pipes and to the metal sheaths of buried telephone and other cables by the action of electricity as now generally employed by electric railway companies for propelling their cars, and, while efforts are being made to obviate the trouble, the success of the remedies proposed or their suitability for constantly changing conditions is somewhat doubtful so long as the rails are employed as a part of the electric return circuit.

It is generally admitted that a complete remedy is found in the use of a return circuit entirely insulated from the earth, such as would be afforded by the use of a double trolley wire; but there is a natural aversion on the part of the street railway companies to such an expedient because of its expense, although it may be seriously questioned whether the deterioration or corrosion of the rails themselves, when buried in the earth and used as a return circuit, is not a source of loss whose magnitude, if fully appreciated, would virtually compel the adoption of this remedy.

The disposition, however, is to palliate the evil, if possible, by improving the conductivity at the rail joints, thereby furnishing so good a path for the return current that the amount diverted to the earth and to buried conductors will not produce a material injury. The injury arising from imperfect bonding had, however, grown to be very great before the extent of the evil had been suspected, and will continue to exist wherever the bonding is imperfectly done or where it may deteriorate.

The question arises an this general state of facts: Upon whom does the responsibility rest for the injuries heretofore accruing, or which may hereafter arise, from the corrosive action of the railway currents? A similar question arose some years ago in controversies between the telephone and electric railway companies. The injury complained of by the telephone companies in these cases was due, not to corrosive action of the railway currents, but to the inductive disturbances upon their pole lines parallel to the trolley wires, and to the presence upon the telephone lines of the electric railway currents passing to earth and thence to such lines.

In the majority of these controversies the courts refused relief to the telephone companies, and it has been suggested that these cases furnish precedents for the disposition of such controversies as may arise from the corrosive action of the railway currents upon buried metal. Their value as precedents is, however, open to grave doubt.

The contention of the railway companies, as advanced in the prior cases, virtually resolved itself into the claim that they cannot be held liable for the injuries caused to neighboring property through the operation of their road by electricity, because their enjoyment of their rights and franchises is in pursuance of legislative authority. But, as said by the Supreme Court of the United States in a similar case, the grant of powers and privileges to do certain things does not carry with it immunity for private injuries which may result directly from the exercise of those powers and privileges, nor is the liability of a company to respond for damages caused by it affected by its corporate character. Its liability for annoyance, discomfort or damage is the same as that of individuals for a similar wrong.

Nor is its liability affected by the extent or character of its franchise. Whatever the extent of the authority conferred, it is accompanied with the implied qualification that it shall be so exercised as not to work an annoyance or damage to others, and, even if that authority extend expressly to permitting the use of the rail return, the liability for damage caused thereby cannot be escaped, although in some quarters the notion prevails that the railway company cannot be held liable, on the general rule that whatever is authorized by competent authority cannot be treated as a nuisance.

There is, however, a wide distinction between that class of cases in which the act complained of is a public work, done under the authority of the government by persons deriving no personal advantage, but acting within the best of their skill and scope of their authority, and that in which the act, complained of as having wrought injurious consequences, is done by private individuals and not essentially for a public purpose, but for private emolument. In the one case the execution of the act is a public duty imposed by the government, and which, having been accepted, must be executed; no claim can lie for consequential damages arising from the execution of that duty. The act of the other is not essentially and only for a public purpose, but mainly for private emolument.

The electric railway company, in respect to individuals or the public, stands in the position of doing an act for its own profit and benefit, the direct and necessary consequence of which is an injury, if the act from which that injury arises is the use or operation of its system by a return through the rails. The act upon which the legal injury is founded is not the operation of the road by electricity generally, but the employment of the specific kind of plant which the company has elected to build and operate, not because the purposes of its character, so far as the benefit of the public is concerned, could be best carried out by that plan of operation in preference to the system which would work no injury, but because it is primarily for its own pecuniary benefit, though attended by a continuing and grave pecuniary damage to the physical property of others.

It cannot be justly claimed that the beneficial uses of the street, so far as the public is concerned and in respect to the uses for which the railway company becomes the servant of the public, are in any substantial manner enhanced by the employment of the earth or rail return circuit in preference to that other method which was open to the railway company to employ, though at considerably greater expense and, of necessity therefore, at a diminution of profits. Facility and speed of transportation in the city streets is the primary purpose or benefit in consideration of which railway companies enjoy their franchises to employ the electric current, but no one can safely affirm that this benefit can be accomplished only by the use of that one of the known systems of distributing the electric power which is now generally employed.

The question is, practically, whether the railway company, for its own profit, and not for the benefit of the public interest in the streets, shall be allowed to employ that method of distributing its power, of which the usual and known consequences are to work a serious interruption to the enjoyment of a previously granted franchise in pursuance of which the streets and the earth have been occupied for the operation of a plant in what was, at the time of its installation, a well-known and recognized way and was within the corporate powers and grants. There are wrongs, or damage, for which the law provides no remedy, and it is the general rule that if the owner of property, in the prudent and necessary exercise of his own right of dominion, does acts which cause loss to another, it is, as the law puts it, *damnum absque injuria*. So, too, acts of public agents, within the scope of their authority, if they cause damage, cause simply *damnum absque injuria*.

With some exceptions the general rule is said to be that no person is liable for damages incidentally occasioned to others by the necessary and beneficial use of his own property or of a franchise granted to him by the State; that every man has the right to the natural use and enjoyment of his own property, and if, while lawfully in such use and enjoyment, without negligence or malice on his part, an unavoidable loss occurs to his neighbor, it is *damnum absque injuria*.

On these general propositions a Circuit Court of the United States denied relief to a telephone company, injured by the operation of an electric railway with a ground return; but the decision seems to have rested largely upon the erroneous assumption that the use of the ground return was necessary to the enjoyment of the franchise of electrically propelling cars. Even if, however, the use of the single trolley be lawful, the charge of negligence cannot be escaped if the railway company fail to use the best method of bonding its rails, provided that bonding would remove the damage from corrosion, and any damage that could be shown to have resulted from its failure to use the best means in its power would be recoverable.

While the failure to use the double trolley may not, in the opinion of the courts, constitute a reasonable ground for charging negligence in those cases where a telephone company is injured by induction or vagrant currents passing on to its lines and ringing its bells, such a ruling affords no precedent under which the railway company may be held to be relieved of the obligation to use the best rail return after it has elected to adopt that method of enjoying its franchise. But not a few cases are found in the reports wherein a company is held liable for damages caused by acts done within its chartered powers.

A notable one, peculiarly apposite to the matter here treated, is that of a corporation charged with repairing the public streets, and which, in so doing, used rollers so heavy as to injure buried gas pipes. The rollers were economical and well fitted for the purpose, but the repairs could have been effected by rolls which would not have produced the injury. The defendant was held liable for the injury. Here was a case of a public grant to a gas company, enjoyed in a certain way, followed by the grant to another company to exercise a right which, if exercised in one way, would injure the former, but, exercised in another, would not.

In another case the defendant was a corporation engaged in digging a canal. In the prosecution of the work it was found necessary to blast rocks, and the fragments injured adjoining property. For this immediate and direct damage, resulting from an authorized act necessary to the enjoyment of the privilege, the company was held liable.

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* From *Cassier's Magazine* for April.

In still another case a company, under authority of the government to enter a city with its tracks and to construct such works as it might deem expedient for the completion and maintenance of its road, placed its engine repair shops in a position where they interfered with the use of neighboring property, acquired by the plaintiff long before the shop was built. The Court held that such authority did not permit it to place its shops wherever it might think proper without reference to the rights of others. The Court said:

"Whatever the extent of the authority conferred, it was accompanied by the implied qualification that the works should not be so placed as, by their use, to unreasonably interfere with and disturb the peaceful and comfortable enjoyment of others in their property. Grants of privileges or powers to corporate bodies, like those in question, confer no license to use them in disregard of the private rights of others and with immunity for their invasion."

As to the running of the cars in the streets, it held that no one could complain of the incidental inconvenience unavoidably following the occupation of the streets by the cars and the noises attending the running of them. The damages by electrolysis cannot, however, be said to be unavoidable, because there is a plain remedy in the use of the double trolley, the employment of which is not inconsistent with the full enjoyment of all the advantages to the public from electric transportation. Among other instances are the flooding of another's land by a party authorized to build a dam. The authority was held not to carry with it immunity for the resulting damage. So, also, the diversion of the waters of a running stream by the trustees of a city, authorized by statute to provide a water supply for a city, was held actionable.

In another case a railway was adjudged not liable to a telephone company on the ground that the dominant purpose of the streets is public travel and transportation, and the right of the railway company to use improved modes of conveyance was, therefore, superior to the rights of the telephone company. Whether or not this decision be sound, it is obvious that it affords no support for the proposition that the railway company is not responsible for material and direct damage to gas and water pipes.

While the chief use of the streets is for travel, this is not the only use recognized by the law. The laying of water and gas pipe has long been recognized as a necessary use, and may be well held superior in importance to that use which involves the employment of electricity in the particular way which works a damage to the property of others, while another way, free from objection, is open to adoption. Claims to immunity for damage, because of superior right, will not, we imagine, avail the railway as defenses in any suit brought for a damage that could be proved to result to water or gas pipes from the grounded electric railway return.

In the telephone cases the courts were apparently influenced to a decision in favor of the railway company by the consideration that the injury to the telephone company was in the nature of an inconvenience rather than a direct or material damage—the visible, positive and necessary result of the railway current. The opinion seems to have been that as there was no actual, physical invasion or destruction of property, amounting to a taking, or visible damage, capable of exact ascertainment, therefore, the injury should be treated as consequential and not to be remedied in the absence of fault or negligence in the exercise of the railway franchise.

Nevertheless, it is well recognized that a serious interruption to the common and necessary use of property may be equivalent to a taking of it, and so be within the prohibition found in the constitution of most of the States in America that private property shall not be taken for public use without just compensation, and it is not to be supposed that the courts intended to go so far as to ignore that principle, founded on the natural principals of equity.

The damage to water and gas pipes is a continuing and material one, involving a physical destruction of property and practically an invasion of it by a foreign agent or force, called into action and directed to the pipes by the acts of the railway company, and which, like other natural agents, as water, light, heat, is, as Blackstone puts it in the case of water, a "wandering thing," only kept in bounds and directed by some positive means applied by the user.

In prior adjudications upon the rights of telephone, telegraph and electric light companies, as joint occupants of the public streets, courts have apparently found difficulty in dealing with the subject, because, in the strictest sense, there is no physical invasion of property such as exists in the case of the flooding of lands or a trespass on property.

Modern research, it is true, indicates that light and electricity are but different manifestations of properties of the same medium, filling all space and termed ether, and modern theory goes so far as to assert that such apparently diverse forces as electricity, light and gravitation are properties of this one universal and all-pervading ether.

A recent Secretary of the Treasury of the United States has ruled that electricity, conveyed by conductors laid across the frontier, is not dutiable, being, as the learned Secretary put it, "intangible and not capable of being measured," and a State court has exempted an electric light company from taxation as a manufacturing corporation on the ground that electricity is not a manufactured article.

Nevertheless, although electricity is not a substance or fluid in the ordinary sense, the idea of fluid pervades the whole language of electrical science and even the definition of electrical units, as adopted by all scientists, suggests a fluid theory, and so the analogy of water naturally suggests itself in dealing with the present subject. So dealt with. the law furnishes many analogies in its treatment of the rights of riparian owners and of persons injured by water, heat or other natural agent.

Many of these analogies support the proposition that the invasion of a telephone company's plant by foreign and superior currents, if producing a serious interruption of, or interference with, its use, is a damage for which the law gives a remedy, but the analogy approaches much nearer to exactness in the cases where the injury goes beyond the mere annoyance or temporary interruption to use, such as was considered to exist in the case of the telephone companies, and involves the actual physical destruction of the property invaded, as is the case of corroded water and gas pipes or telephone cable sheaths. These injuries cannot be dismissed as mere incidental inconveniences, unavoidably following the use of electricity for street car propulsion. The damage is a continuing, physical one, and is repeated with every repair. It is, moreover, the natural proximate and immediate result of the use of the ground return, chosen by the companies in preference to the double trolley, mainly for their own convenience and profit rather than for giving increased speed of transportation.

It has been urged, as in the telephone cases, that the demand for damages or injunction by those whose previously acquired property, or rights of property, are injured by the railway currents introduced into the earth, amounts to a claim to the monopoly of the use of the earth. But priority of enjoyment of a right is frequently a factor in determining what is or is not a nuisance. Thus, it was held to be a nuisance in a certain case for the defendant, a pastry cook, to put into a room in his house which adjoined a room of the plaintiff, previously long used as a wine cellar, a stove so large that, when it was being used, it heated the wine cellar and made it useless for its purpose.

Blackstone says of nuisances: "If one does an act in itself lawful, which, yet being done in that place, necessarily tends to the damage of another's property, it is a nuisance, for it is incumbent on the person to find some other place to do that act where it will be less offensive." And it is a general rule that acts, lawful in themselves, may become unlawful if exercised without regard to time, place and circumstances. An offensive trade may not be established on one's land to the prejudice of the previous occupants of neighboring land; but if the neighboring land be not occupied there is no nuisance.

In the previously mentioned case of the railway repair shops, established on land owned by the company, to the interference with the enjoyment of neighboring property, one of the grounds upon which the court granted relief was that the property had been acquired and put to the special use which was interfered with, long before the railroad shop was built.

A distinction exists between such injuries as may result from the uses of the public streets by different persons, owing to a conflict of their interests and methods of use, and such injuries as may result to the rights of the owners of abutting property, due to corporate or other acts in a street or highway. As between two occupants of the public highway, each exercising its right by legislative authority through the power of control which the State has over the streets for public uses, the State may, in the exercise of its power of eminent domain, authorize a beneficial use in a manner to work an injury to another use beneficial to the public, if public necessity or convenience may require it. But this is subject to the constitutional right of the person injured to just compenstion if the injury amount to a taking or damage, or amount to more than a mere incidental injury or inconvenience. But, in respect to abutting property there resides in each owner an easement or right to the unrestricted use and enjoyment of the street for purposes of access for drainage, supply of heat, light, water, etc., which the law recognizes as appurtenant to the land and not passing with any conveyance of the street or land thereof to the State or corporation for street uses.

Each lot owner has a peculiar interest in the street which neither the State nor the municipal corporation, nor the general public can pretend to claim—a private right of the nature of an incorporeal hereditament legally attaching to his continuous grounds and the erections thereon; an incidental title to certain facilities and franchises. This easement, appendant to a lot, is as much property as the lot itself. For an injury to that right the law gives the land owner a remedy by injunction or award of damages, according to the nature and the circumstances of the injury.

While the electric railways may lawfully occupy the streets for the purpose of facilitating the uses of the streets for passage and transportation, they cannot impair or lessen lawfully an abutting owner's easement in it by any method of operation which attaches to the maintenance and use of the electric railway in any special or particular manner. As was held in the elevated railway cases in New York, the use of the streets by the railway structure operates to take from the abutting lot owner a portion of his easement in the street, without making compensation, and, hence, as to him, it is illegally there, although, so far as concerns the public, the rights of the road could be allowed to stand. The illegality in respect to the lot owner was not in making use of the franchise legally granted, but in appropriating a part of the owners easement without acquiring it by negotiation or condemnation.

In this particular case the easements taken were those of light and air, impaired by the presence of the structure and by smoke, cinders, gases, etc., which were necessary accompaniments of the operation of the road. But there are other easements which undoubtedly belong to the abutting lot owners, namely, the right of gas and water connections; and, if these be impaired by the use and operation of the electric railway, there is an injury or damage for which the owners are entitled to compensation.

The appropriation of the land forming the street for street uses carries, by implication, the extension of those in vogue at the time of the grant, dedication or conversion, to those which the progress of civilization and the growing demands of increasing population may require; therefore, a use of the streets for cars or vehicles propelled by electricity, in so far as increased rapidity of movement may be beneficial, is within the purposes of the original use. But this principle cannot be equitably extended so as to legalize particular ways of employing the electric force which are inconsistent with, and subversive of, those prior, necessary uses of the soil of the street for carrying water and gas pipes, or of the right of the abutting owner to make connection with them.

While, therefore, the courts may dismiss the claim of a telephone company for damages arising from joint occupancy of the streets because the injury is the result of a joint attempt of individuals to make use of that to which each alike has a right, and is produced without fault or negligence on the part of the railway company, no such disposition would necessarily follow as to any claim which the owner of an abutting lot might make for damage to his easement in the street for the purposes of water and gas pipe connection, because, on principle, that use stands practically upon the same footing as his right to secure light and air from the street.

A remedy exists for the injury by corrosion to which buried pipes and cables are at present exposed through the operation of the electric railway companies, and while the difficulty is, from the electrician's standpoint, best met by resort to the double trolley, there is sufficiently reasonable expectation of relief from the expedients which are now being proposed to free the railway companies from the charge of negligence.

The remedies now proposed will in any case probably so diminish the evil that it will become difficult to place the liability, or to say with certainty that the extent of corrosion to be hereafter observed is not attributable rather to the direct corroding influence of the constituents of the earth itself or to the decomposing action of the weak currents which may be set up, as in an earth battery, by different sections of pipe or cable, electro-positive and negative to one another either by reason of the difference of the metals themselves, or by different kinds of earth in which neighboring, similar metals are buried.

It is beyond the compass of this paper to discuss the different ways in which feeble earth currents may be set up, but inasmuch as recent experiments seem to show that a mere directive force in the way of electric pressure, even so low as 0.001 of a volt, is sufficient to produce electrolysis of the earth salts and liberate corroding agents, it is quite obvious that without resorting to the double trolley the corrosion may be so far diminished by other proposed means that the responsibility for the corrosion remaining cannot be fixed upon the railway companies.

FINANCIAL NOTES.

Reported Consolidation Denied.—President William S. Scull of the Camden Horse Railroad Company of Camden, N. J., and Hewlings Lippincott, President of the West Jersey Traction Company, have denied that a consolidation of the two companies was contemplated.

Decree of Sale Entered.—In the Circuit Court on March 28 a decree of sale was entered in the case of the Illinois Trust and Savings Bank, of Chicago, versus the Fort Clark Electric Railway Company, of Peoria. The company has 10 days in which to pay its indebtedness of $297,583.36.

New Bond Issue in Wilkesbarre, Pa.—The Wilkesbarre &Wyoming Valley Traction company has decided to issue $350,000 bonds for the purpose of building the new line on theEast Side, equipping it, erecting a new power and car house, double tracking the Nanticoke line and equipment for present and prospective extensions,

Consolidation of Four Railways.—A certificate of consolidation of the Geneva Surface Railway Company, the Geneva & Waterloo Railway Company, the Waterloo, Seneca Falls & Cayuga Lake Railway, and the Seneca Electric Railway, forming the Geneva, Waterloo, Seneca Falls & Cayuga Lake Traction Company, has been filed in Albany.

Road to be Sold.—Judge Craig at Stroudsburg, Pa., has issued a decree ordering a receivers' sale on Monday, April 22, of the personal property and effects of the Delaware Valley Electric Railway Company. The sale will include the property and franchise of the East Stroudsburg and Matamores Railroad Company, which have become invested in the Delaware Valley Road.

Beaver Falls, Pa., Road Sold.—The following named capitalists of Beaver Falls have purchased the Shenango Valley electric street railway, running between Sharon and Sharpsville, and organized a new company by electing these officers: President, A. M. Jolly; secretary, A. R. Leyda; treasurer, F. G. Barker; directors, F. D. Runser, A. R. Leyda, J. P. Stone, F. G. Barker, A. M. Jolly, J. C. Whitta, G F. Kennedy; superintendent, F. G. Runser. The new company proposes to improve both the road and rolling stock, and give the public better service.

Calumet Electric Railway Bonds.—The Calumet Electric Street Railway Company of Chicago has filed a trust deed to the Equitable Trust Company of Chicago to secure $3,000,000 gold construction bonds. The deed is to run for 40 years. The bonds to be issued are of the value $1,000 each, interest payable semi annually at the rate of 5 per cent. a year. Under a condition of the deed $500,000 is to be withheld for the extension of the line, the purchase of property or the equipment of the road. The railway company also agrees to pay all taxes and assessments that may be levied on the bonds in addition to the interest.

Metropolitan Street Railway Bonds.—The Metropolitan Street Railway Company, operating the Broadway cable railway, the new Columbus avenue railway, the Ninth avenue surface railway, and other street car lines in New York, has filed at the Register's Office mortgages amounting to $8.000,000, of which $3,000,000 was taken by the New York Guaranty and Indemnity Company, and $5,000,000 by the Central Trust Company as trustees. The mortgages were executed for the construction of two new lines of the traction company, the Lexington Avenue & Pavonia Ferry and the Columbus & Ninth Avenue Railways. The bonds bear 5 per cent. and are payable in 1903. The mortgages are secured by all the properties, rights, privileges and franchises of the Metropolitan Street Railway Company.

Metropolitan Traction Rumors Denied.—The report that the Metropolitan Traction Company, of New York, has not earned its last dividends is emphatically denied by the officials. A few days ago William L. Elkins and Peter A. B. Widener stated that the company had fully earned all its dividends and much more, and that the new mortgage bonded indebtedness of $8,000,000, which had been originally taken by the New York Guarantee and Indemity Company and the Central Trust Company, of New York, had all been marketed. They denied that any difference existed between the New York and Philadelphia parties interested in the company, but said that all were entirely harmonious, and that none of them had been parting with stock, as had been stated. They denounced the recent downward movements in the stock as prompted by improper motives, and declared there was nothing in the affairs of the Metropolitan Traction Company to warrant the bear movement or the false reports which had been circulated to cause it. President Charles B. Henderson, of the company, in New York, also denied the report that its dividends were not earned, and said the company was never in better condition financially than now, and its properties never more valuable, a statement which Messrs. Widener and Elkins also fully endorsed. There were renewed rumors of pending litigation growing out of the matter, but it was denied at the close of the day than any legal proceedings of any kind had been begun by anybody.

NEW INCORPORATIONS.

Venice, Ill.—The Venice, Madison and Granite City Railway Company has been incorporated; capital stock, $60,000; incorporators, C. H. Sharman, Fred E. Allen and E. J. Spencer.

Bloomington, Ill.—The Bloomington Traction Railway and Electric Company has been incorporated; capital stock, $75,000; incorporators, George W. Funk, Henry Capen and James A. Wilcox.

Chicago, Ill.—The Chicago Subway Arcade and Traction Company has been incorporated with a capital stock of $15,000,000. The object stated in the charter is to construct subways in Chicago and operate a line of cars with dummy engines.

Newtown, Pa.—The Newtown, Langhorne & Bristol Trolley Street Railway Company has been incorporated with a capital stock of $60,000. The promoters are Geo. C. Worstall, Newtown, Pa.; Henry Lovett, M. D., Langhorne, Wm. B. Parry, Langhorne.

Chester, Pa.—The Prospect Street Railway Company has been incorporated with a capital stock of $50,000. The promoters are: Geo. Rodgmen, 315 West Second street, Chester, Pa.; Wm. D. Pullon, Jr., 614 West Sixth street, Chester; Edward J. Nugent, 540 East Eighth street, Chester, Pa.

Philadelphia, Pa.—The Berwyn & Deven Passenger Railway Company has been incorporated. The capital stock is $18,000, and the company proposes to build a street railway in Chester County. The promoters are Geo. Roney, 1925 North Seventh street; John A. Barry, 225 South Thirty-third street; Russell Hawkins, 3238 Chestnut street, Philadelphia.

Oakland, Cal.—The Piedmont & Mountain View Railway has been incorporated with a capital stock of $1,000,000, to purchase and acquire all the railway rights, franchises, rolling stock and property of the consolidated Piedmont Cable Company and to operate same. The promoters are: Chas. R. Bishop, San Francisco, Cal.; Ernest A. Heron, John R. Spring, of San Francisco, Cal.

NEWS OF THE WEEK.

Boston, Mass.—Work has been begun on the subway proper. Only 25 men are employed at the present time.

Boston, Mass.—The Senate Committee on Street Railways has reported against a petition to allow street railways to make contracts to carry United States mails, freight, merchandise or express packages.

New Haven, Conn.—The printed report that the New York & New Haven Railroad Company has been directly or indirectly acquiring an electric road at Stamford, in this State, is denied by officers of that corporation.

Galveston, Tex.—The Buckeye Engine Company, of Salem, O., has filed a suit in the United States Circuit Court against the Galveston City Railway Company to recover $14,936.78 for machinery furnished the railway company.

Ilion, N. Y.—The State Board of Railroad Commissioners has granted the application of the Herkemer, Mohawk, Ilion & Frankfort Railway Company for the privilege of substituting electricity for animal power on its line.

Detroit, Mich.—Work has begun on the new power house of the Citizens' Street Railway Company, near the corner of Rivard and Atwater street. The excavating for the foundation is under way. Work will be pushed forward as rapidly as possible.

Brooklyn, N. Y.—President P. H. Flynn, of the Nassau Electric Railroad, of Brooklyn, has applied to Judge Van Wyck, in the City Court, for an injunction restraining the city authorities from interfering with the construction of his line. The Court granted a temporary injunction.

Boston, Mass.—The board of aldermen gave a hearing on Wednesday on the petition of the Boston Elevated Railway Company for locations for tracks in this city. Herbert L. Harding, secretary of the Citizens' Association of Boston, opposed the road, and Willard Howland represented the Elevated Railway Company.

Denison, Tex.—The syndicate that purchased the street railway line has been granted a franchise by the city council, to build a double track on Main street and substitute electricity for mule power. It is the company's purpose to build out to the new artificial lake, and establish there a commodious summer garden.

Albany, N. Y.—East Greenbush has voted a franchise for the electric road. All of the towns have now come into line and granted franchises except Greenbush, but from the present outlook there seems to be little doubt that the board will consider the matter favorably on April 15, when it meets to consider the matter.

Milwaukee, Wis.—Two suits were begun in the United States Court in Milwaukee last week by the Johnson Company, of Johnstown, Pa., against Alexander S. Lynn, superintendent of construction of the Milwaukee Street Railway Company. The complaints charge that Mr. Lynn is manufacturing and using a railway and a tongue switch the rights to which are vested in the plaintiff and it asks for a temporary injunction.

Fort Wayne, Ind.—Some weeks ago several employees of the street railway company were discharged and the charge was made that the dismissal resulted from the fact that the men belonged to a labor organization. Dismissal for such a cause violates a statute passed by the Legislature in 1893. Superintendent McNutt was indicted on the charge, but the indictment has been quashed by Judge O'Rourke.

Thomaston, Me.—The principal matter to be decided at the town meeting on March 25 was that of granting the Rockland, Thomaston & Camden Street Railway a location through the town. This the voters have steadily refused to do, and for two years the company has had tracks laid to the town line and there stopped, awaiting the desired permission to enter. This year two sets of selectmen had been nominated, one in favor of the electric road, the other opposed. The former won.

Brooklyn, N. Y.—Judge Cullen, of the Supreme Court, has handed down a decision in favor of the Brighton Beach Railroad, and has vacated the temporary injunction which had been procured by Louise M. Beekman and Marion D. Collom, two property owners, to enjoin that corporation from erecting an elevated structure from its station on Atlantic avenue along Franklin avenue, connecting with the Kings County Elevated road in Fulton street.

Norristown, Pa.—The Court has granted a perpetual injunction against the Montgomery County Passenger Railway Company restraining it from running cars on the branch line from Bridgeport to Swedenland, in Upper Merion township, a distance of one and a half miles. The Court held that the electric railway tracks occupy land belonging to the Pennsylvania Railroad Company and pass under its bridge in Upper Merion, and that the railroad company has suffered irreparable damage.

New York, N. Y.—The Broadway cable, above Thirty-sixth street, and also the whole of the Columbus avenue section, were stopped for almost two hours last Sunday. The cause was the bursting of the 7½-inch steam pipe which conveyed the steam from the boilers to the big engine on the Sixth avenue side of the power house at Fiftieth street. Frederick Davis, an oiler, who lives at No. 285 Fifty-third street, South Brooklyn, was severely scalded on the back and shoulder, and was removed to the Bellevue Hospital.

Boston, Mass.—J. Otis Wardwell, counsel for the Massachusetts street railways, says that the defeat of the bill giving street railway companies the right to carry mails will have no effect in preventing the companies from adopting mail service. He says: "When we came to look into the matter we found that the United States government had a right to make contracts for carrying the mails with any railroads it deemed best. without securing the consent of any legislature. In consequence, the passage of the bill was of no consequence to us."

New York, N. Y.—Arthur H. Masten has been appointed referee by Justice Beckman in Supreme Court Chambers to pass upon the question of the forfeiture of the franchise of the North and East River Railroad Company, which for several years has been running a railroad through Fulton street from the East River to Cortlandt street ferry on the North River. Proceedings have been taken against the company at the instance of the Comptroller, because of the neglect of the company to pay its taxes, as required under its franchise. The object of the suit is to have the franchise declared forfeited and its resale.

New Haven, Conn.—A contest for the possession of a charter for an electric road from New Haven to Hamden, Conn., has been begun by G. S. Benham and others securing an injunction restraining the New Haven & Centreville Railway Company from laying tracks in Dixwell avenue. The Legislature of 1893 gave the latter a charter to run a line to Hamden, provided that the road should be built and in operation in nine months. Benham and his associates were given a charter by the same Legislature to run a line over the same route in case the New Haven & Centreville Street Railway Company failed to complete the work of building the road within nine months. The latter failed to keep this provision, and are now at work on it. The plaintiffs claim that they have forfeited their charter and claim it for themselves.

Washington, D. C.—On April 2 the drivers of the Anacostia Street Railway struck for higher wages but the trouble was settled peaceably on April 3 after a conference of several hours between President Griswold of the company and representatives of the drivers and the street railway employees' union. While the conference was taking place an attempt was made to break the blockade of cars by moving the leading one, and the policeman who was guarding the driver was knocked senseless by a brick. The agreement between the company and the strikers was a compromise, the men agreeing to the present schedule on condition that, if the traffic receipts for the current month are in excess of those for April, 1894, the excess shall be divided among the employees. All the cars are running. The stablemen had joined the drivers but returned to work when the agreement was announced.

PERSONALS.

Mr. F. B. Badt, of the Siemens & Halske Electric Company, Chicago, has been in New York recently.

Mr. Charles E. Newton, of the Jewell Belting Company, of Hartford, Conn., was in New York this week.

Mr. James F. Cummings, of the Cummings & Engelman Conduit Company, was in New York last week.

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TRADE NOTES.

The Wason Car Works at Brightwood, Mass., have completed a half century of car building this year. With the exception of last year, when its business as well as that of other firms suffered, the company has had a most successful history. The business now is picking up in a very encouraging way in the manufacture especially of electric cars for new electric roads. But steam car business is still dull.

Berlin Iron Bridge Company's Contracts.—The Collins Company, at Collinsville, Conn., is putting up a new retort house, which will be of iron. It will be designed and built by the Berlin Iron Bridge Company, of East Berlin, Conn. The new Capitol Avenue Bridge, at Hartford, Conn., which will be built by the Berlin Iron Bridge Company, will consist of two span plate girders, each 82 feet, with a roadway 25 feet in width and two sidewalks.

RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued March 26, 1895.

536,229. Device for Operating Railway-Switches; John F. Ober, New Orleans, La. Filed Sept. 29, 1894. Serial No. 524,497. The platform is provided with a transverse slot and a tube is arranged beneath the same, having a bracket arm pivotally connecting it with the platform. The tube is provided with a plunger, the top of which is provided with a foot piece. The lower end is adapted to connect with the switch-operating mechanism. A spring is arranged within the tube and surrounds the plunger.

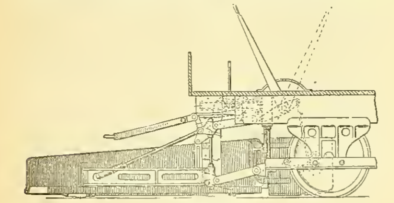
536,235. Car-Fender; Mahlon M. Scott, Newark, N. J., assignor of one-half to Elvin W. Crane, same place. Filed Jan. 26, 1894. The fender comprises a slanting tubular frame and a guard is mounted thereon and provided with rearwardly extending arms. Springs actuate the guard forwardly in line with the frame. There is a flexible apron or net on the guard and a supplemental guard is hinged to the rear of the forward guard means being provided for operating the two in unison.

536,250. Adjustable Switch for Trolley Systems; Montraville M. Wood, Chicago, Ill. Filed July 14, 1894. Tongues are adjustably attached to a plate or body portion of the switch, and a mechanical clamping device is associated with the tongues by which they are firmly clamped and held in any desired position, the mechanical clamping device being adapted to grip and clamp the trolley wire.

536,256. Electric Railway-Switch; Rollin A. Baldwin, South Norwalk, Conn., assignor to the Fitch-Excelsior Switch Company, of New Jersey. Filed Oct. 21, 1893. This is the combination of a single electro-magnet, a vibrating switch point, a reciprocating rod attached to the switch point, a thrust rod moved in one direction by the magnet and connections whereby the movement imparted to the thrust rod by the magnet will cause the reciprocation of the reciprocating rod in either direction.

536,262. Car-Switch Device; Samuel M. Bradley, Keene, N. H. Filed Sept. 22, 1894. The switching wedge is adapted to swing on the axle and against the rim of the wheel. A switch-bed continuous with one of the track rails has a fixed part adapted to engage with the switching wedge.

536,273. Fare-Register; Leo Ehrlich, Gustavus Rein and Ephron Catlin, St. Louis, Mo., Assignors to the Louis Register Company, same place. Filed Nov. 5, 1892. Claim 1. reads as follows: "The combination of the trip-register, the permanent register normally in gear with the trip-register, a hold-back pawl for the trip and permanent registers, a slide for releasing the permanent register with its hold-back pawl from engagement with the trip-register, another pawl moved into engagement with the trip-register by the slide, and means for returning the trip-register to zero."



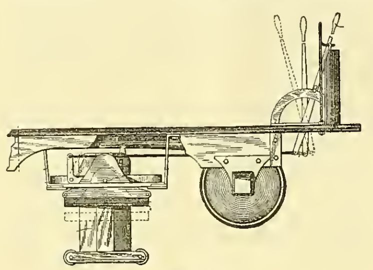
No. 536,328.

536,275. Supply System for Electric Railways; Charles E. Emery, Brooklyn, N. Y. Filed March 15, 1894. The conduit is non-insulated and a series of live supports is connected to an electric generator through a main electric conductor. A series of intermediate supports is both arranged within the conduit and adapted to support a flexible conductor, where a drag arm passing through a slot in such subway carries an electric conductor insulated from such slot and connected to electric apparatus on the car and to a flexible conductor operating in connection with such supports.

536,300. Street Car Screen Guard; Edward W. Selkirk, Chicago, Ill. Filed May 31, 1894. This is the combination with the frame of a car, of a screen bolt and socket attachment of the lower side of the screen to the car, cleats attached to the uprights of the car frame and having vertical lateral flanges, clips attached to the upper side of the screen and having rigid jaws adapted to engage the flanges of the cleats, and a swinging lock latch mounted on one of the cleats and adapted to hang vertically above the jaws of the clip, the end of the latch being beveled backwardly.

536,325. Car Impelling Mechanism; Victor Belanger, Boston, Mass., Assignor of one-half to Mary E. Brady, same place. Filed Jan. 25, 1895. The car impelling mechanism comprises a motor, a driving pinion loose on the driven axle of the car and operatively connected with the motor, a loose eccentric surrounding the axle and provided with a detent engaging member or flange, an internal gear journaled on the eccentric and meshing with the driving pinion. There is a self-adjusting connection between the internal gear and the axle whereby the gear is caused to rotate with the axle and permitted to move laterally independently thereof. There is a double or two-armed detent, the arms of which are arranged at opposite sides of the flange, and two chains or flexible connecting devices extend from the arms to operating devices at opposite ends of the car, means being provided for yieldingly holding said arms out of engagement with the flange.

536,328. Snow-Plow for Street Railways; Francis W. Dean, Cambridge, and William E. Mathews, Boston, Assignors to the Taunton Locomotive Manufacturing Company, Taunton, Mass. Filed Feb. 1, 1895. A plow-share is arranged obliquely across both rails of the track and in front of the wheels. A supporting frame comprises a longitudinal trussed beam and a transverse tie beam, both firmly secured to said plow-share and to each other. There are two pairs of radius arms connected at their movable ends to the frame and plow-share, and means having provision for moving the radius arms about their axes of motion and raising or lowering said plow-share and frame bodily. (See Illustration.)

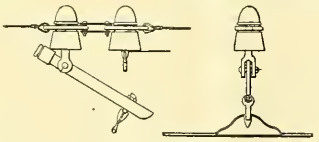


No. 536,329.

536,329. Cable-Car Brake; Jean B. Z. Dumais, Chicago, Ill., Assignor of one-half to Charles Bachrach, same place. Filed Jan. 21, 1895. A support depending from the bottom of the car is adapted to enter the grip-slot. There is a plate on one or both sides of the support, free to slide vertically thereon and inclined or beveled on its outer face. Mechanism is provided whereby the attendant may quickly force the inclined or wedge-shaped plates down into the spaces between the support and the respective slot-rails. (See Illustration.)

536,374. Conduit Electric Railway; Frederick S. Davenport, Jerseyville, Ill. Filed January 28, 1895. A casing is secured to the wall of the conduit, and is adapted to inclose and support the insulated feed-wire. There are openings in the insulating covering of the feed wire, and elastic bands or diaphragms of insulating material adapted to hermetically close the openings. Metallic contact studs, passing through and made air-tight in said elastic covers or diaphragms are rigidly secured in metallic spring arms insulated from the feed-wire. A collecting contact bar is supported by, but insulated from, arms depending from the car truck, and is adapted to come in contact with and depress the free ends of the spring arms so as to press the contact studs upon the feed-wire as it travels over them. An insulated wire electrically connects the collecting bar with the motor.

536,418. Street Car Fender; Michael Clooney, St. Louis, Mo., Assignor of two-thirds to Robert McCulloch and C. Nesbitt Duffy, same place. Filed Dec. 24, 1894. The fender comprises a pair of arms fixed to the front rail of the truck frame, a plank hinged to the arm by means of a longitudinally positioned rod passing through the plank, a guard-bar hinged to the forward edge of the plank, flexible loops provided with metallic hooks fixed to the front edge of the guard-bar, a transverse arm adjustably mounted upon the brake rod and underneath the car-body. A rope or cable is secured at any suitable point in its length to the end of the transverse arm, its ends being secured to eyebolts, one of each of which is positioned upon each side of the center of the plank, forming a part of the fender.



No. 536,429.

536,425. Cable-Grip; Louis Hachenberg, New York, N. Y. Filed Feb. 16, 1895. A reciprocating grip-shank moves vertically within the grip body, hinged wings being provided with upwardly projecting arms. Links connect the arms with the grip shank and a lifting sheave is mounted on one of the wings. Two wedging sheaves on the grip-body are located on opposite sides of the shank, springs being adapted to act on the wings for opening the same, and means being provided for operating the grip-shank.

536,429. Signal for Railway Crossings; Edward A. Hermann, St. Louis, Mo. Filed Oct. 4, 1894. This is the combination with twin insulators, of an arm pivoted to one of the insulators, and an insulation on one end of the arm to contact with the insulator when the arm is in its normal position, and the trolley-wire is supported by the other end of the arm. There is a spring contact on the other insulator, and a wire leading from the contact to ground or a return-wire, and in the length of the wire is introduced a signaling device. (See illustration.)

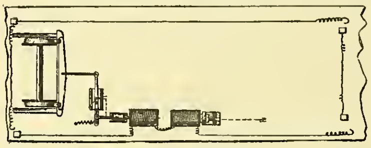
536,459. Rail Brake; Frederick L. Desmoineux, Lawson, Colo. Filed May 14, 1894. The longitudinally movable spring pressed brake rods are arranged above the central portion of the truck and connected with the swinging shoes thereon, mechanism being present for moving the brake rods against their springs.

536,474. Means for Operating Railroad Switches; Samuel H. Miller, Champaign, Ill. Filed Dec. 15, 1894. Bearings are secured to the dashboard of a car, and a rotatable and vertically movable rod is journaled to and works in the bearings, with the handle at the upper end of the rod, the blade at the lower end thereof, the foot piece secured to the rod, the collar and the spring secured to the dashboard with its free end bearing against the collar.

536,471. Pulley for Cable Railways; Elias M. Johnson, New York, N. Y. Filed July 14, 1894. The pulley for cable railways is formed by the combination of a cast-steel rim, a cast-iron hub and wrought-iron spokes. Their ends are bifurcated and flattened and bent outwardly in opposite directions and inserted in the cast-steel rim and cast-iron hub to permit the metals used in casting the rim and hub to incase or surround the bifurcated or flattened ends of the wrought-iron spokes and firmly unite the rim, hub and spokes together.

536,475. Car-Fender; William A. Morris, Brooklyn, N. Y., assignor to himself and Roswell W. Keene, same place. Filed Nov. 8, 1894. The fender is movably mounted under the car, a bar slidingly mounted under the car and provided with a hook adapted to engage the rear part of the fender and hold the same in its elevated position. A level is pivoted at one end to the car, a link is pivotally connected at one end to the lever and at the other end to the sliding bar. A projection is pivoted to the lever and extends through the car floor, a spring holding the parts in operative position.

536,499. Bell-Ringing Device for Vehicles; Samuel A. White and Augustus M. Glover, Savannah, Ga. Filed Sept. 9, 1893. Projections revolve with an axle, a hinged swinging bar is arranged in striking proximity to the projections. Two springs which are of different tension are connected to the aforesaid bar, whereby they act in opposite directions. A rod or other suitable connection is arranged beneath the car and is connected with the springs, and means are at hand for applying tension to the rod to overcome the stronger spring, and thereby allow the weaker one to throw the swinging bar into contact with the projections for working an alarm.



No. 536,535.

536,518. Car Fender; Adams Hare, Allegheny, Pa. Filed Aug. 17, 1894. A guard is hinged to the car lever pivoted to the car, supporting the guard in an elevated position. A notched arm is pivoted to the lever, also a plate for fixing the adjustment of the notched arm and a guide frame within which the notched arm works when it is being tripped.

536,535. Electric Brake; Edward D. Lewis, Savona, N. Y. Filed Nov. 12, 1894. There is a fixed electro-magnet, a movable electro-magnet in the same circuit therewith, a brake beam, a lever connected to the brake beam and the movable magnet, and means for regulating the throw of said lever. (See illustration.)

536,539. Car Truck; William McKee, Catasauqua, Pa., assignor of two-thirds to James W. Fuller and Thomas Bragg, same place. Filed May 25, 1891. The four-wheeled motor car truck consists essentially of two truck frames and an axle mounted in each frame. A running plate extends from one truck frame to the other, and an overbalanced motor is carried on one axle and is suspended from the inner end of its truck frame, with a supporter for the inner end of the truck frame carried by the running plate.

REISSUED.

11,481. Closed Conduit Electric Railway; William Lawrence, New York, N. Y., assignor to the Lawrence Electric Company, same place. Filed March 26, 1894. Original No. 516,631, dated March 13, 1894. Claim 1.: "In a system of electric distribution, a main conductor, a contact, a connection from the main conductor to the fixed part of said contact, a weighted lever carrying the movable part of the contact, a sectional working conductor, a rod connecting the moving conductor with a weighted lever, and a water tight casing inclosing the contacts and lever."

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Death of George M. Phelps.

It is with a feeling of deep sorrrow that we announce the sudden death of Mr. George M. Phelps, for years identified with the *Electrical Engineer*, of New York City. For a third of a century he had been connected with electrical interests. He was a veteran in the field of electrical journalism, and as such was widely known and highly esteemed. He will be sadly missed in all electrical gatherings, where he has been a familiar figure, whose companionship was always sought. Those who have had the good fortune to be associated in any capacity with Mr. Phelps can testify to his many estimable traits of character. He was generous and loyal to his friends, and considerately thoughtful even in his business relations.

European Street Railway Statistics.

The table of statistics of European electric railways, presented elsewhere in this issue, makes it possible to institute comparisons that are not without interest. The aggregate length of European electric lines, located in nine different countries, is 191 miles, a total that appears small indeed when it is found that in the single city of Brooklyn the electric railway lines stretch out to a length of at least 331 miles. Again, it is seen that the power necessary to operate the European electric railways is 10,654 K. W. This total is less than the average output of the central station of the West End Street Railway Company of Boston. which is over 11,000 K. W., while it has reached as high as 13.270 K. W., or over 25 per cent. more power than is necessary to operate all the electric railways of Europe.

Report on the Brooklyn Strike.

We devote a generous amount of our space this week to the report of the legislative committee which recently investigated the Brooklyn street railway strike, and we think that the document will be found of unusual interest. The findings of the committee justify in every respect the position assumed by the STREET RAILWAY GAZETTE at the time of the great disturbance. The committee insists, with great emphasis, upon the fact that the disorder was to a very large extent the natural outgrowth of the policy of inactivity and vacillation followed by the municipal authorities, and it holds that had the administration been energetic, the appeal to the military arm would have been wholly unnecessary. The criticism of Mayor Schieren is exceedingly sweeping and severe. Too great a share of blame, we think, is laid upon the Mayor personally, and not sufficient upon those who were directly in charge of the police department. Some of the statements which the committee makes are so obviously true that no argument is needed in their support, for example, it is argued that the time to submit a controversy to arbitration is before a strike is declared and disorder has been begun. While this appears to be a simple enough truth now, no sort of argument could make it apparent at the time of the strike. The position of the strikers in reference to arbitration seemed to be a belief that when the companies had been weakened sufficiently by the results of disorder. they would be glad to submit the controversy to arbitrators in order to end the trouble. Many of the questions brought out by the strike are discussed ably and sensibly in the report; in fact, the document is in every respect a far more intelligent consideration of the strike and its consequences than anyone had the right to expect, in view of the character of so many of the reports issuing from the New York Assembly. One thing that we have failed to find in the report is a discussion of the conditions under which the men were influenced to leave their places. They were misled, we believe, by their notoriety-seeking leaders, whose motives and actions we should like to have had investigated by the committee and characterized in the report.

Lenox Avenue Electric Conduit Railway.

It is not necessary to look far to discover a reason for the great interest which centers in the electric conduit railway installed in Lenox avenue, New York City. The explanation is not that it is the most serious attempt yet undertaken on this side of the Atlantic to solve the conduit problem; the reason is rather that the results which are likely to follow the operation of the line may prove to be far reaching. Up to this time it has not been possible to point to any American conduit road operated by any great railroad company successfully and on any extended scale. It is certainly true that one persevering and enterprising company has attained a certain measure of success in its experiments along this line, but the conditions surrounding the trials of its system have been such that its efforts have attracted no great amount of public attention, and the results can hardly be regarded as furnishing a complete solution of the problem. While it has not been possible to refer to the marked success of any undertaking of this kind, it has been easy to enumerate failures of a most complete character, such, for example, as those in Boston, in Cleveland and Allegheny, and those who have sought for electric railway franchises in large cities have so successfully exploited their doubts of the practicability of conduit roads that overhead franchises have been comparatively easy to obtain. The system in Budapest, to be sure, has been frequently held up as "an object lesson for American municipalities," to quote the words of the writer of a recent article in one of the magazines, but, because of its location in a foreign city, this road has not appeared to be of particular significance to American city councils. In the Lenox avenue road, on the other hand, we may have an object lesson near at hand, that, shown in the greatest city in the country, will attract the maximum of public attention. If the line proves successful in operation it will demonstrate that an electric railway can be operated, under the conditions that exist in American cities, by conductors located below the surface of the ground—a possibility so often denied—and can be equipped with a complete metallic circuit, so that the electrolysis of buried pipes by escaping currents will be made impossible. The demonstration may introduce a new order of things. Franchises for overhead wires in cities may be much harder to obtain, and possibly there will be a general demand for the disappearance of aerial railway wires. This demand will be in many, probably in most cases, wholly unreasonable, but it will be none the less persistent and urgent on that account. That such a change in relation to overhead railway wires may follow the success of the Lenox avenue road affords, we think, a true explanation of the interest taken in that installation. If its operation is as successful as there is every reason to believe that it will be. the line will doubtless prove to be the first of a great many roads in large cities operated by a double trolley system located underneath the ground.

COLLISION BETWEEN TWO STREET RAILWAY COMPANIES IN CHICAGO.

The Chicago General Street Railway Company, which operates a line on West Twenty-second street, Chicago, has thus far been unable to secure a down town outlet for its cars. Its road terminates at a point two miles or more from the center of the city. It has been endeavoring to secure the privilege of running cars over the tracks of the Chicago City Railway Company to the business district, but it has not been successful in reaching an agreement with that company. Recently the manager of the company, Congressman Lawrence McGann, announced a new doctrine in reference to the control of street railway tracks, which, if correct in law, would enable the company, beyond a doubt, to operate its cars over the line of the Chicago City Railway Company, regardless of that company's wishes in the premises. According to this principle, all rights in the streets are perpetually vested in a city without regard to franchises which have been granted. The municipality can, therefore, give a street company the right to make use of its streets, but the latter cannot prevent the entry upon this thoroughfare of another company, any more than it can stop a carriage or a common vehicle from using the street. So far as the use of the rails was concerned, the courts, Mr. McGann argues, could prescribe an equitable rental, in the event of a failure of two companies to reach an agreement.

Mr. McGann determined last week to act upon this doctrine forthwith, by sending one of his cars across the West Twenty-second street bridge to the tracks owned by the Chicago City Railway Company. It was decided to make the attempt on the afternoon of April 4th. The car which it was decided to send into the territory of the Chicago City Company without its consent, was drawn by horses and was occupied by several officers of the company. When it reached the east side of the bridge, Superintendent Bowen, of the Chicago City Railway Company, ordered the car stopped. When an attempt was made to continue. the wrecking wagon of the Chicago City Railway Company was brought into service. A line was attached to the invading car and it was drawn off the tracks. The men then proceeded to wreck the car so that it was in no shape to proceed. A large crowd gathered and a riot was at one time threatened, but the danger was averted by the street railway men, who stated that this incident was preliminary to a contest in the courts, which would pass on merits of the controversy.

The counsel of the Chicago City Railway Company refused to express any opinion concerning the incident. Superintendent Bowen, of the company, made the following statement of his position:

"I learned through the newspapers a few days ago that an attempt was to be made to run a car over our tracks. I made up my mind that it should not be done. I know nothing of legal technicalities. I had no opinion from a lawyer. I simply knew that what I considered an act of trespass was to be committed, and I acted within what I thought and still think were my rights. I ordered the men whom I needed to come along; in number they were 400 or 500. The horses drew the car over the bridge, and as soon as their feet were planted on our tracks I went to their heads, held up my hand, and ordered the driver to stop. He stopped, and the superintendent of the road came up to me and asked me if I had an injunction. I said 'No.' Then he turned to the man on the platform and said, 'Drive on.' The car struck our tracks and started down the incline. I turned to my men and ordered them to hitch the wrecking wagons to the car. This was done, the car was pulled from the tracks, turned over, and broken up."

C. L. Bonney, counsel of the General Street Railway Company, made this statement:

"We do not know just yet what we will do. The question is whether to proceed civilly or criminally. There is not the slightest question about this matter of the destruction of our property. The action taken by Superintendent Bowen was not the remedy, if remedy be needed, that the law provides. The destruction of our property took place within the limits of our ordinance. The car was wrecked west of Grove street. We acknowledge it was on rails laid by the City Company, but the right of way was our own. If what has happened to-day does not furnish us with the basis of a test case we have two more cars which may be used in the same kind of service as the one which suffered to-day. We also rely on the constitutional provision, which declares all railroads to be public highways."

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TROLLEY MAIL SERVICE FOR BOSTON.

Arrangements have been completed for the introduction of a mail service on the West End Street Railway in Boston. The new system will probably go into operation about May 1. Six routes have already been arranged and the number will probably be increased. The post office officials made several interesting tests before it was decided to use the cars for carrying the mail. It was found that on an average 10 minutes were saved when the mails were carried by the electric cars instead of by the wagons. On certain lines the saving was considerably greater. The schedule time of the wagons, from the Central Post Office to Dorchester, for example, has been 50 minutes, but it was found when the mail bags were carried on the trolley cars that 21 minutes could be saved. It is estimated that when the new system is in operation four more mails per day will be given to the various stations reached by the electric cars than are called for by the existing schedule. It is estimated that the new mail cars will cover about 390 miles daily, or 130,000 miles annually. The new cars will resemble in general appearance the mail car in use in Brooklyn, and, like that car, will be painted cream-white with gold lettering. They will be different from the Brooklyn car, however, in that they will carry no passengers, as at first proposed, as it is believed that too much time would be lost in making stops. When the new cars are in operation, the wagon service will be materially decreased.

THE LENOX AVENUE ELECTRIC CONDUIT SYSTEM OF THE METROPOLITAN TRACTION COMPANY.

The construction of the electric conduit railway in Lenox avenue, New York City, was the result of the Metropolitan Traction Company's express determination to introduce a mechanical street railway system, the operation of which would not involve the use of overhead wires. Two of the company's roads are now operated by cable, and while this system is favorably regarded, both on account of efficiency and economy as a means of operating these long and comparatively straight main lines, with their great volume of traffic, it is by no means considered applicable to the cross-town and subsidiary lines. In fact no system up to this time has seemed entirely practicable as a substitute for animal power on these lines. As a consequence, by far the greater part of the mileage of the Metropolitan Traction Company, and indeed of all the street railway companies of New York City, is operated by horses. Beyond a doubt the Metropolitan Traction Company would have introduced the overhead trolley system on certain parts of its immense system had it been possible to secure the necessary franchises. Certainly many of those heavily interested in that company may be numbered among the firmest believers in the trolley system, but a permission for aerial railway wires is not obtainable in New York City below the annexed district. Public sentiment against overhead wires is too strong, as the result of abominable wiring for electric lighting some years ago, and a franchise for overhead conductors for street railway, even under the elevated structures, could not be secured from any board of aldermen. The Metropolitan Traction Company's anxiety to improve its service led to its famous offer of a prize of $50,000 for the discovery of a street railway

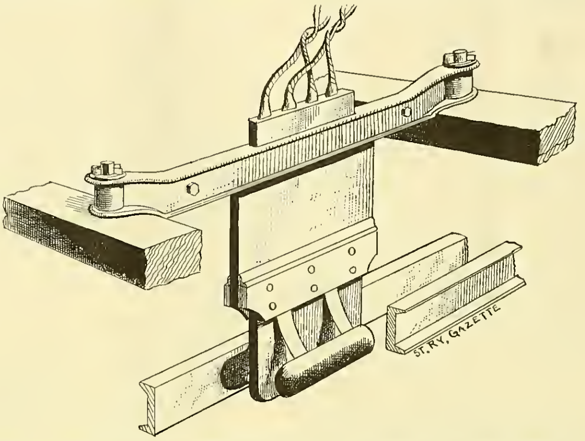

FIG. 1.—TROLLEY TO BE USED ON THE LENOX AVENUE CONDUIT RAILWAY.

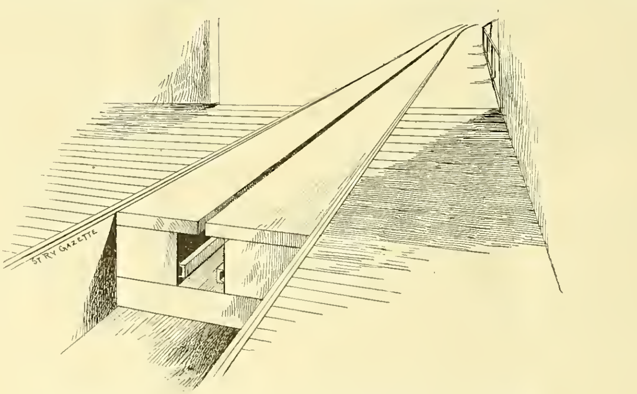

FIG. 2.—INTERIOR OF CAR HOUSE, SHOWING PIT AND CONDUIT.

system possessing the merits of the overhead trolley system, but not involving the use of overhead wires. The announcement of the prize gave rise to the most extraordinary activity among inventors of street railway systems, and a great many of them entered the competition for the prize. Nothing, however, resulted from it, and at the expiration of the time set by the company the offer was withdrawn, as it appeared that none of the competitors had sent in a system considered worthy of adoption, and consequently entitled to the prize.

It soon after appeared that the Metropolitan Traction Company had undertaken the solution of the problem on its own account by proposing to construct an electric conduit road in Lenox avenue. It decided, however, to execute the project on the most conservative lines. It determined to reduce the risk and consequences of failure to a minimum. It proposed, therefore, to construct a conduit of practically the same design as that built for its successful cable lines, but, at the same time, it decided to assume no responsibility whatever for the electrical system to be used in connection with the conduit. If the electrical part of the work proved unsuccessful in operation, the company would still have its conduit to fall back upon and the introduction of a cable system would be a comparatively easy and inexpensive matter. It is understood that the electrical contract was undertaken with this understanding, the Traction company bearing none of the expenses attending the possible failure. No pains or expense have been spared, however, to make the installation successful in all respects. The services of the best electrical engineers have been enlisted and the construction has been thorough in every respect. Little information has been available during the progress of the work, although the utmost interest has been taken in the installation. Inquirers have been informed that the particulars would not be given out until the completion of the work. The installation is now practically finished and the cars are about ready for operation. The Street Railway Gazette is now enabled to describe and illustrate the most interesting and novel features of the road, as well as those of the station which will furnish the power for the line.

The Lenox avenue line is an entirely new double-tracked road. It will connect with the Columbus avenue road at 116th street, and will provide transportation for a district that is now without convenient facilities of this kind. The road extends from the junction of Twelfth and Manhattan avenues, along the former street to St. Nicholas avenue, through that street and 116th street to Lenox avenue, and on that thoroughfare to 146th street. The Lenox avenue part of the line does not pass through a thickly built-up district of the city, but it is believed that when it is provided with good transportation it will be regarded more favorably as a place of residence.

The system installed in Lenox avenue is extremely simple, indeed the builders have depended far more upon the use of the best materials and upon excellence and skill in construction than upon any ingenuity or novelty in design. The installation is, however, by no means without its novel features, but these are matters of detail. It is an open slot conduit, with an underground trolley extending from the car through the slot, which is located in the center of the track. A glance at the illustrations will disclose the fact that the system is by no means a reproduction of the Siemens & Halske conduit road in Budapest. An erroneous idea in this respect seems to have become conviction in in several newspaper offices.

The track construction, which is of the most substantial character, is similar in every respect to that employed in the company's cable lines, with the single exception that in the Lenox avenue line manholes are built every 30 feet. The sectional view of the track construction at the manholes, Fig. 5, shows the principal features of the conduit, which it is proposed to use for the electrical operation of the road. In the equipment of the conduit it was determined to dispense with wires altogether. The conductors which will carry the current are 4½-inch iron channel bars 30 feet in length. They are supported at each manhole by a soapstone pillar 13½ inches in height and 8 inches square. The channel bars are located 11½ inches below the slot rails and are arranged at a sufficient distance away from the slot, so that they will not be affected by any drip entering the conduit from the surface. The soapstone pillar insulators are held in position by cast iron pedestals secured to the bottom of the manholes. The pedestals are provided with cups or sockets 6 inches in depth and 1 inch larger in inside diameter than the soapstone pillars. A space of ½-inch is left, therefore, between the soapstone and the walls of the socket, which is filled with sulphur. On the tops of the insulator are mounted cast-iron caps having brackets on which the conductors rest, being secured by means of bolts passing through the lower flanges.

By this construction and arrangement of conductors it is believed that great advantages will be found in the practical operation of the road. The conductors are sufficiently substantial and rigid, so that it is necessary to support them only at the ends of every 30 feet. According to this arrangement insulators are located only at the manholes, so that these points, at which trouble is most likely to occur, are very easy of access. It is believed that the use of channel bar conductors and the consequent ease of access of insulators will obviate many of the difficulties attending the use of wire conductors in conduits. Because of the stretch of the wires much more frequent supports are necessary, and by the consequent multiplication of these points of attachment the danger of leakage and breaking of insulators is greatly increased. The five pipes represented on the side of each yoke nearest the center of the tracks, in the sectional view of the conduit, are designed for feed wires, to which reference will be made hereafter. The other pipes indicated in the same view are intended for signal wires. The manholes in which the insulators are located are 4 feet 4 inches in depth, 4 feet in length and 14 feet 5½ inches in width, that is, the entire distance of the two tracks. They are constructed of brick with 8 inch walls that rest on concrete foundations. The floors are laid with 6 inches of concrete and are provided with drains for carrying off water. With this provision for drainage no trouble from water in the conduit, will, it is believed, be experienced.

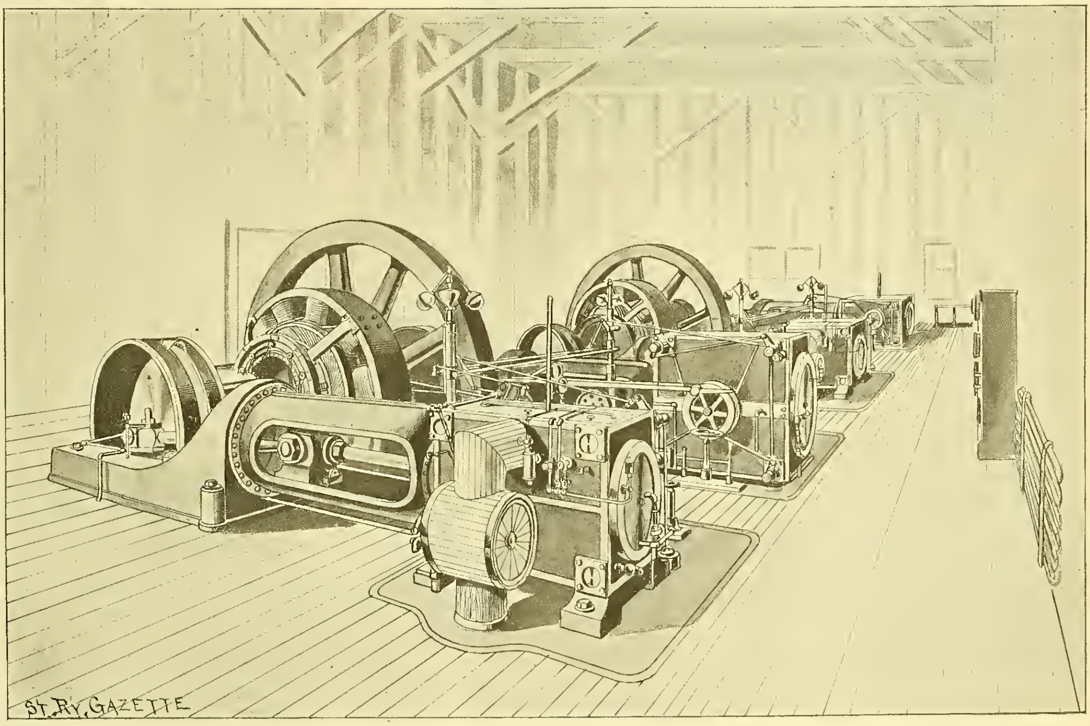

FIG. 3.—POWER PLANT OF THE LENOX AVENUE CONDUIT RAILWAY.

The conduit was built along the grade of the street but the pitch is sufficient, however, so that any water flowing into the conduit will find its way into the manholes, which are located every 30 feet, and thus escape.

A sketch of the underrunning trolley that is to be employed on the system is shown in Fig. 1. It is simple in construction and consists of a ⅝-inch steel bar, provided at its lower end with outwardly pressing springs, which are secured to positive and negative contact shoes. The trolleys are bolted to the cross bars which are attached to the side frames of the car truck.

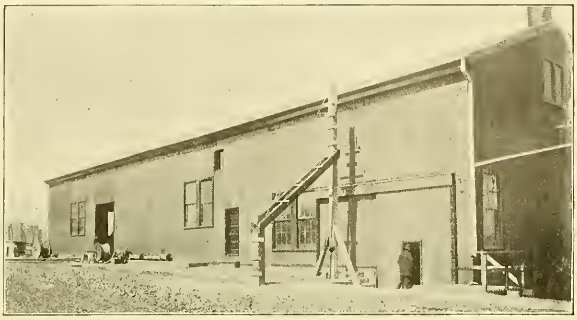

FIG. 4.—PRESENT POWER HOUSE OF THE LENOX AVENUE CONDUIT RAILWAY.

The station, which for the present will supply power for the line, is a temporary wood frame structure inclosed with corrugated iron. It is located on 146th street west of Lenox avenue. An exterior view of the structure is shown in Fig. 4. The present power equipment consists of two cross-compound Allis-Corliss engines of 1,000 H. P. each directly coupled to General Electric 300 volt multipolar generators. Steam is supplied by two Babcock & Wilcox water tube boilers. A view of the engine room is shown in Fig. 3. During the trial runs of the railway system the engines will be run non-condensing. All of the steam pipes and the wiring are located under the floor of the engine room. The feed wires, which are of 500,000 circular mils capacity, enter a subway from the basement of the power house. The subway is located under the sidewalk on 146th street, and extends to the corner of that street and Lenox avenue, where the feed wires are carried through the five-inch iron pipes provided for the purpose in the conduit. These pipes are 10 in number, and, as has already been stated, are located on the side of each yoke nearest the center of the tracks.

For the present, during the trial runs on the road the line will be operated directly from the station. If the drop in the voltage proves to be too great, feed wires will be extended through the pipes provided in the conduit for this purpose and will be tapped into the channel bar conductors at suitable intervals. With the 300-volt current which is to be used on the line a greater amount of copper is required for the feed wires than is necessary for the ordinary 500-volt trolley systems.

The cars which are to be used on the line were constructed by the John Stephenson Company and are mounted on standard cable trucks constructed by the Peckham Motor Truck and Wheel Company. The only change necessary to make the trucks suitable for the electrical service was the addition of supports for the motors. The cars are to be lighted by nine incandescent lamps arranged in groups of three each. Two cars have already been equipped, and it is stated that the company has twenty more which will be put into service as soon as the success of the system has been demonstrated. A car barn similar in construction to the power house has been built at the corner of 146th street and Lenox avenue. The building is provided with four tracks and has a storage capacity for about twenty cars. The tracks are provided with pits for the examination of the trolleys and motors. A view of one of the pits showing the construction of the conduit and the conductors is given in Fig. 2.

It is stated that in case the operation of the electric conduit system proves successful the power plant will be increased by the addition of three direct-connected units of 1,500 H. P. each, making the total capacity of the station 5,000 H. P. In this event, the present unprepossessing temporary structure will be replaced by a handsome brick building for a power plant, car house and repair shops, Fig. 6. It will be built on the west side of Lenox avenue, on which it will extend 200 feet, and its depth will be 559 feet. It will be two stories in height, constructed of a steel skeleton inclosing brick walls and will be fireproof. The car house, the main entrance of which will be on Lenox avenue, will have a capacity for about 350 cars. The offices of the receivers and starters, as well as the waiting room for conductors and motormen, will be located at the corner of 146th street. The car house will be provided with two large elevators, which will be operated by electricity. Ample provision has been made on the ground floor for repair shops and rooms for the engineers and firemen. The superintendent's office and a large reading room for the employees will be arranged on the second floor. In the tower on the third floor accommodations will be provided for the electricians of the station. The design of the new building, which has already been decided upon, is Flemish, and it will be constructed of yellow Roman brick, trimmed with red pressed brick and cut stone. The latter will be of pink granite or red sandstone. The roof will be covered with slag roofing with the exception of the tower, which will be covered with Spanish tiles. All the work on the Lenox avenue system has been executed under the direction of F. S. Pearson, chief engineer of the company, and the architect of the new building is A. B. Porter.

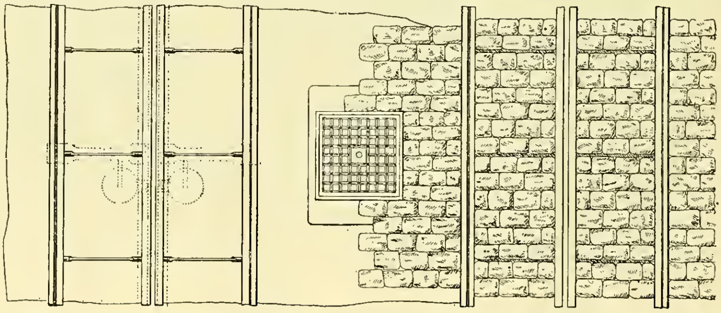

FIG. 5.—PLAN AND CROSS-SECTION OF TRACK CONSTRUCTION OF LENOX AVENUE CONDUIT RAILWAY.

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RAILROAD COMMISSIONERS' REPORT ON A BROOKLYN ACCIDENT.

The New York State Board of Railroad Commissioners recently investigated the electric car accident in Brooklyn which caused the death of Mrs. Mary A. Medinger on March 26. Mrs. Medinger alighted from a car on the Court street line of the Brooklyn City Railroad Company, and was struck by a car going in the opposite direction. The report of the Board is extremely harsh. It states that if the southbound car had stopped at the crossing and waited until the northbound car had discharged its passengers and then gone on the accident would not have occurred, and it was admitted by employees of the company that such a rule would be feasible in all parts of Brooklyn. The Board says:

"It is pertinent here to call attention to the fact that the adoption of such a rule, viz.—cars shall not meet on street crossings—was recommended by the Board in its annual report for 1893, and again in its report for 1894, that the recommendation was called specifically to the attention of the presidents of the Brooklyn surface roads on Jan. 7, 1895, and that the recommendation was again renewed in a formal presentment relative to the management of the Brooklyn trolley roads, issued on Feb. 26, 1895. Either the car was running at the rate of speed much higher than seven miles an hour, when approaching the church crossing, or the motorman did not or could not apply the brakes as promptly as he should have done, and as he testified that he did.

"The conclusion of the board is that the management of the company deserves the severest censure for persistently refusing to adopt the rule already stated, which was first recommended a year and a half ago. Since this rule was first recommended it has been largely adopted by other companies. The management of the Brooklyn City Company has persistently declined to put it in force, although the recommendation has been twice made in a general form, and once in a report bearing especially upon the methods of operation by this company. Such continuous disinclination to change its methods of operation evinces a degree of stubbornness or avarice amounting to a reckless and criminal disregard of human life and of the highest obligation of a carrier of passengers."

The board adopted the following order: "Ordered, That the report herein and the recommendations of the board heretofore made and served on said company in the matter of an investigation of accidents on trolley railroads in the city of Brooklyn, dated Feb. 26, 1895, together with a copy of the evidence taken thereon, be referred to the attorney-general with the request that he take such action as may be proper in the premises to enforce such recommendations, upon failure of said company to, within ten days from the date of this order comply with such recommendations."

DEATH OF GEORGE M. PHELPS.

Mr. George M. Phelps, of the *Electrical Engineer*, of New York City, died at his home, in Brooklyn, on last Wednesday evening. Few men in the electrical field were better known. Since 1861 he had been continuously connected with electrical interests. Mr. Phelps was the son of the well known electrical inventor, George M. Phelps, whose patents on the Phelps ticker, Phelps telephone and others were acquired by the Western Union Company. Mr. Phelps was born in Troy in 1843, and received his education in that city. He first engaged in electrical work in the shop of the American Telegraph Company, of which company his father was the superintendent until its absorption, in 1854, by the Western Union. From 1863 to 1866 he was employed in the auditing department of the American Telegraph Company. From 1871 to 1879 he assisted his father in the management of the Western Union Company's factory in New York City. When, in April of the latter year, the company discontinued manufacturing and disposed of its factory, to the Western Electric Company, he was appointed superintendent by the latter company. This position he held until December, 1885. Early in the following year he joined Mr. Franklin Leonard Pope in conducting the *Electrician and Electrical Engineer*, which was published as a monthly, and soon after he acquired a proprietary interest in the journal. When the *Electrical Engineer* became a weekly Mr. Phelps was elected president of the company organized to publish it.

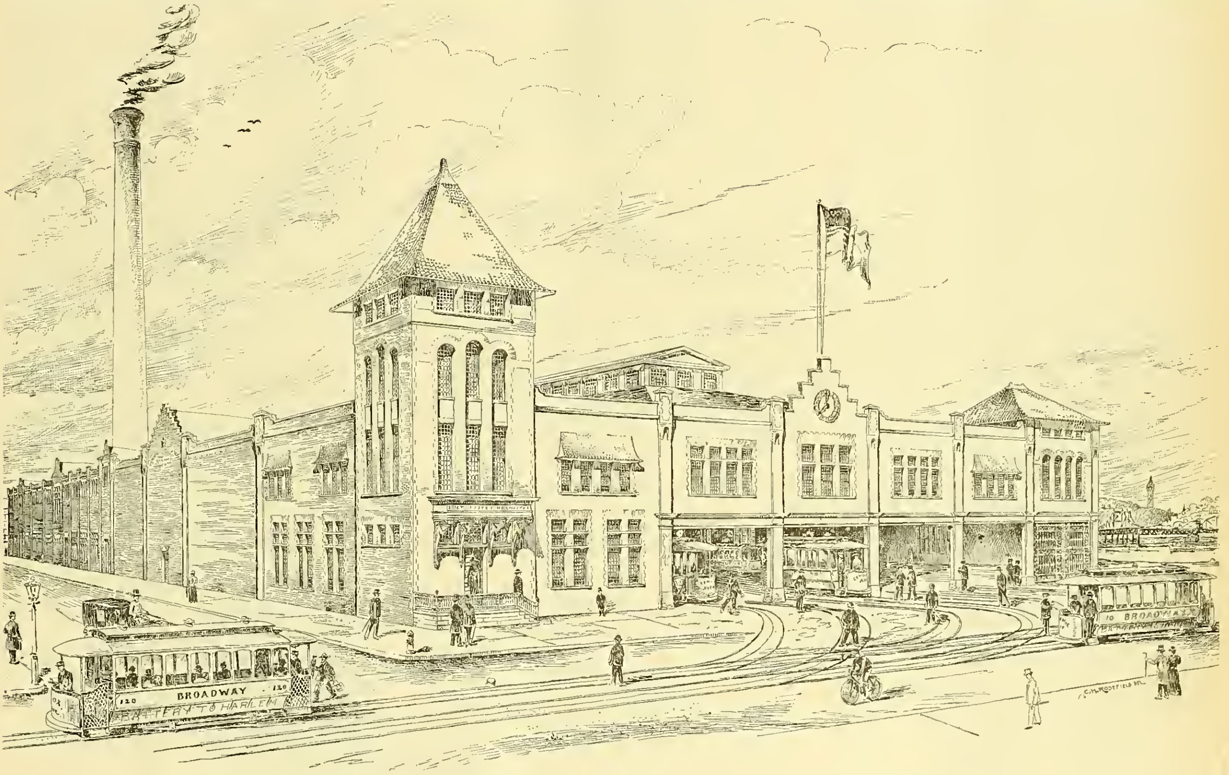

FIG. 6.—PROPOSED POWER STATION AND CAR HOUSE OF THE LENOX AVENUE CONDUIT RAILWAY.

He was a charter member of the American Institute of Electrical Engineers, and was elected one of its managers on May 19, 1885. He served on the Council in this capacity until his election as treasurer on May 17, 1887, to which office he has been reelected each year, and which he held at the time of his decease. He had been nominated for the same office by the Council for the term beginning May 14, 1895. He was a member for many years of the Hamilton Club of Brooklyn, and Reform Club of New York. Mr. Phelps was a genial, kindly gentlemen, a loyal, thoughtful friend, considerate in his treatment of all with whom he came in contact.

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RECEIVER FOR THE OSWEGO ELECTRIC RAILWAY.

E. A. Emerick has been appointed receiver of the Oswego Electric Street Railway Company of Oswego, N. Y. The application for the appointment of a receiver was made by agreement with the directors. The interest on the company's bonds was defaulted on April 1. It is stated that the outstanding obligations aggregate about $135,000. The company owns a little over five miles of track and operates seven motor cars. The capital stock is $125,000, and the funded debt is $122,500.

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AN AGREEMENT BETWEEN THE WESTINGHOUSE AND GENERAL ELECTRIC COMPANIES.

It now seems to be generally understood that the General Electric Company and the Westinghouse Electric and Manufacturing Company have signed an agreement for pooling the patents of the two companies. According to the agreement, it is stated each company will have the right to use the other's patents. Each will contribute a certain proportion of its earnings to a common fund, which will be employed for the defence of patents against infringement.

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A USELESS FIGHT.—It will do the steam railroads no good to try to stop the trolley lines. The only possible relief for them is to form companies of their own and build the trolley themselves, thus forestalling the rivalry.—*Altoona (Pa.) Mirror*

LEGISLATIVE COMMITTEE REPORT ON THE BROOKLYN STREET RAILWAY STRIKE.

The special committee of the New York Assembly, which recently investigated the Brooklyn street railway strike, submitted its report this week. The report criticizes the municipal authorities of Brooklyn for their temporizing policy in dealing with law-breakers, and it also alludes to the sympathy with the strikers and rioters shown by the police officers and certain of the police justices, but the blame is laid upon the municipal authorities and not upon the rank and file of the police department. The report narrates at some length the history of the strike, which is now well known, enumerates the causes of the trouble, and after quoting some of the testimony taken at its sessions, refers to the negotiations between the street railway companies and the strikers as follows:

"The contracts sought to be entered into with each of these roads were practically the same in all respects, save that the contract with each company made special provisions with regard to the number and proportion of regular cars and so-called trippers to be operated upon particular lines of road. Negotiations continued until Jan. 12, when the companies, being unwilling to accept the terms proposed by the executive council, and the executive council in its turn, unwilling to accept the terms proposed by the companies Mr. Lewis had asked for an opportunity to send a notice to the employees individually, but before he was able to do so the district assembly ended the matter at its meeting on the evening of Jan. 13, and later on that night Mr. Lewis refused to let the electrical workers have the cars. Thereafter and during the strike an effort was made by third parties to bring about a reconciliation through arbitration. Arbitration had not been resorted to and not even been suggested by either party previous to the declaration of the strike. Had that been done and an arbitration had there is no doubt in the minds of your committee that the entire difficulty might have been avoided and the men have been saved from their present condition of distress, the companies saved from a heavy loss, the public saved from the temporary paralysis of its means of transportation and the attendant losses and disorders, and the city saved from both the cost of the employment of 7,500 armed men to maintain the public peace and the shame of the confession on the part of the municipal government that it was unable to maintain the public peace by ordinary civil means."

The report cites at length the terms of agreement between companies and men concerning hours and trips, afterward proceeding to a lengthy history of the Brooklyn Heights Railroad and the Long Island Traction Company. This is followed by sketches of the Brooklyn, Queens County and Suburban, the Atlantic Avenue and the Brooklyn City and Newtown railroads. Concerning the cause of the strike this is said:

"It is easy to say the strike was caused by the failure of the men and the companies to come together as to certain points in the agreement for the year 1895. The question still remains as to what was the cause of this failure of agreement. The real cause of the strike, in the opinion of your committee, is not the mere failure to agree, which was a symptom only, but the fact that the relation between capital and labor had been peculiarly strained in this case—labor demanding more, notwithstanding the very large advantages it had secured to itself through the contracts of the preceding eight years, and capital creating an adverse public opinion, and acting upon the theory and belief that it had the opportunity for gaining large and unusual profits by methods, the legality of some of which is questionable; all in such manner as to bring about a feeling on the part of the men that they were being unfairly dealt with; while the corporations themselves were handling their properties for the purpose of stock speculation, and for the amassing of fortunes."

In considering the responsibility for the strike, the committee says that the employees considered themselves called upon, after the introduction of electric motive power, to do a class of work requiring greater skill and expertness than that which prevailed when horses were used. The point is brought out, however, that the employees did not stand upon any demand for an increase of wages, except in the case of the Brooklyn City & Newtown Railroad Company." The report continues:

"Their demand was rather to shorten the day's work, and through the rearrangement of the proportion of regular cars to trippers, to necessitate the employment at full day's wages of a larger number of men. It is undoubted that there was a general feeling on the part of the employees that the railroad company, under the new system, was making, or was about to make, larger profits, as incident to the introduction of that system, and that they, as employees of the road, were to contribute to this by the performance of service which exacted closer attention and made a larger strain upon their nervous systems and capacity for endurance. This feeling undoubtedly helped to precipitate the strike.

"The men deliberately sacrificed rights and positions which have been slowly and steadily gained through many years of intelligent and wise negotiations and amicable relations with the companies, in addition to having sacrificed their employment and sustained tremendous pecuniary losses and subjected themselves and their families in some instances to hardships and suffering of the most dreadful character. The corporations, either through their failure properly to have estimated the cost of construction of their roads, or through their inability because of the panic which occurred in the spring of 1893, and the effects of which have still continued, to secure the money necessary to carry out their plans, have utterly failed in their project, that a complete reorganization is now absolutely necessary."

"This case is one which presents with peculiar force the situation which is likely to arise in conflicts between capital and labor, where capital seeks to reap exceptional profits through the creation of speculative opportunities, and in practical, if not in actual, defiance of the spirit of our law; and where, on the other hand, labor, believing that it is not accorded its share in the profits of the business, is willing to go so far as to bring about the paralysis of the complete system of transportation and to sacrifice not only advantages gained after long struggle, but to throw large bodies of men out of employment, under conditions which make their re-employment in the same service impossible, because of the impossibility of compelling their employers to re-engage them.

"There was no time during the strike when the railroad companies so wholly failed to perform their duty as carriers as to justify a forfeiture of their charters, but from the 13th and 19th of January such performance was technical and nominal rather than actual, owing to the inability on the part of the roads at that time to secure men to act as motormen and conductors, in sufficient number to run the customary number of cars and the customary number of trips, without submitting to the terms of their late employees.

"Men came from all parts of the country, and, as a result, the railroad companies were able entirely to reorganize their working staffs, although the strike of the former employees was not officially declared off until the 24th day of February.

"During all of this time the community was receiving only an imperfect service at the hands of the companies; for the first fortnight the most incomplete and unsatisfactory, and for the last fortnight gradually approximating the usual and customary condition.

"The total number of men, so far as is ascertainable, who went out on strike, was about 5,000, and of this number not more than 10 per cent. have since been re-employed."

As to the consequences of the strike, the report says: "It appears that previous to the strike the mayor of the city had already expressed his dissatisfaction with the management of the police force, so far as concerned the capacity of the superintendent of the force. He knew that he was incompetent to command the force because of his age, lack of memory and want of physical capacity, and this opinion was concurred in by the commissioner of police; but, nevertheless, no steps had been taken to secure his removal, and he was at the head of the force when the strike was declared and when the troubles and disorders in the city broke out. Such being the case, it appears that the direct command of the force was assumed by the police commissioner himself. It does not appear, from the testimony given by the mayor, that the commissioner of police had, prior to his assumption of that office, ever been in any similar business or had any particular qualification or training for the performance of the duties of the chief of police; and it is the belief of your committee that the attempt on his part to assume the direct executive management of the police force was necessarily at the time a disturbing element in itself and a very decided error.

"It appears that there was some consultation between the mayor and the commissioner of police as to the appointment of a sufficient number of extra or special policemen under the law, but the suggestion was dismissed at the time as being impracticable, although in this respect your committee is satisfied that both the mayor and the commissioner of police were also in error.

"It appears from the evidence that the police force itself sympathised very largely with the strikers and the disorderly elements, and it is certain that during the early days of the strike the force made only a most insignificant number of arrests, which does not indicate any such state of affairs as to have necessitated the calling in of the militia. All of the evidence goes clearly to demonstrate the fact that during the first two days of the strike the municipality was strangely lacking in capacity and energy, and permitted the disorderly element to realize the fact that it had the police force of the city at a disadvantage, and was thereby encouraged to greater disorderliness and more frequent and serious breaches of the public peace.

"Your committee is of the belief, after hearing the evidence, that at this juncture the mayor of the city, as well as his police commissioner, showed a most marked lack of fitness and capacity for the offices which they hold. We may say in passing that in other respects the mayor, while under examination, showed a strange unfamiliarity with and in some cases ignorance of the machinery of the municipal government of which he is the executive chief. The weakness and want of energy on the part of the administration which prevailed during the early days of the strike was replaced by a corresponding sternness and rigor after the municipal authorities had permitted the disorders to gain such headway as to lead them to fear that the situation was becoming peculiarly serious and fraught with danger. We believe that they as far exceeded the requirements of the case in calling in the militia as they disregarded them in not having fully utilized the police force of the municipal government itself before the militia was called in.

"Of this number (of persons arrested) a very large proportion was discharged by the magistrates before whom the prisoners were taken, because, in the opinion of the magistrates, the evidence was not sufficient to justify commitment; and in some cases undoubtedly because of the sympathy on the part of the committing magistrates with the men who had gone out on strike. The evidence discloses clearly, however, that, just as the police during the early days of the strike had failed to make arrests and to take active steps to suppress disorders, so, during the latter days of the strike and after the militia had been called in, they became suddenly active in making arrests, and in many cases made their arrests hastily and without sufficient justification. The police force of Brooklyn is composed of competent, capable and faithful men as a rule, and there is no doubt, so far as your committee is concerned, that the real trouble was at the top and not with the rank and file. Your committee is of the opinion that, with an able, firm and thoroughly energetic municipal government, it would never at any time have been necessary to have called in militia. In plain English, it is the belief of your committee that the municipal authorities lost their heads. After the militia had been withdrawn a large force of special police was placed on duty, but was not found to be efficient. After the department had so signally failed in managing and securing results from the regular force, this is not surprising.

"We believe the entire situation would have been different if the mayor, when he first became satisfied that the superintendent of police was superannuated, had insisted upon demanding his retirement and upon the appointment of a younger and more competent man. We are of the opinion that had the mayor and commissioner of police called upon volunteers to serve as special policemen before calling the militia in, and had the police department itself been well administered, that an ample force could have been secured to have prevented all of the disorders which subsequently occurred. The disorders of the first few days were not serious, and could have been easily coped with. It was when the disorderly element realized the nervelessness and want of energy of the municipal government that the situation first became dangerous. The calling in of the militia only had the tendency the more thoroughly to embitter the feeling on the part of the men who had gone out on strike and their sympathizers throughout the community. It cannot be doubted that at all times during the strike the fear of disorder was very much greater than the disorders which actually occurred. As a matter of fact, while there was considerable injury to the companies' cars, the number of assaults upon persons were peculiarly few in view of the excitement which ruled throughout the city and of the opportunities and number of occasions when assaults and violations of an aggravated character were likely to have occurred. There was but one death, and that was accidental, having been caused by the shot of a militiaman, and no employee of the roads being in any way responsible for it.

"It is impossible for the committee to say to what extent such violations as were committed and such damage as was done were actually done by the strikers themselves. While the city government had no responsibility as to or in connection with the incidents which led up to the causes of the strike your committee regards the mayor and commissioner of police in very large measure responsible for the social conditions which followed it. The weakness betrayed by the government was in itself a practical invitation to the disorderly elements to disregard the law; and had it not been for this weakness your committee believes that most all of the serious consequences, the paralysis of the railway service, the disorderliness which prevailed throughout the city, the cost to the city of the militia, the cost of the extra police force and the shame of the confession of official inability to maintain order with the usual civil means at the command of the government, might all have been obviated. It should be reported that after the difficulties had occurred and when the danger was over the mayor secured the resignation of the chief of police, notwithstanding the fact that he was retained pending the strike, but relegated to practical inactivity, and the police force had been left virtually without an active head. The mayor of the city sought to place the responsibility for the failure to maintain the public order in some part upon the police magistrates."

The removal of Police Justice Quigley and the dismissal of the charges against Justice Watson are then discussed by the report.

"The cost of the strike is estimated as follows:

To the employees of the roads who went out on strike down to the present time..................	$750,000
To the railroad companies themselves, because of the paralysis of traffic and the loss of fares (not ascertained).	
Injury to property of the railroad companies (not ascertained, the companies not having supplied the data in either of the two foregoing cases).	
Cost to the city for the pay and maintenance of an armed force of 7,500 men..........	200,000
Extra cost to the city for police service during the strike..	75,000

"It is impossible to estimate the loss to the citizens through the paralysis of trade, and the general inconvenience and disorder incident to the complete or part deprivation of their means of transportation in and about the city. It is also impossible to estimate to what extent the courts may possible hold the city responsible for damages caused by the failure to maintain order.

"It is evident to your committee that, if possible, some means should be found to compel the employees of railroad companies to give proper notice of intention to leave, as well as to compel the companies themselves to give proper notice of the intention to discharge. . . .

"Your committee is of the opinion that no satisfactory bill can be drawn at the present time looking to compulsory arbitration, particularly in view of the fact that the principle itself involves an infringement of personal liberty."

The Ten-hour law, as amended, is considered ineffective, and the committee doubts its constitutionality. It recommends that the employees of corporations exercising public franchises should all, so far as practicable, be made quasi-public servants and licensed. The report adds:

"In consequence of having accepted such service in companies exercising public franchises, they should be required to give proper notice before abandoning such service, and in all cases where the men in a body seek to abandon such service without notice and in such manner as to threaten or as actually to work loss and danger to the community, the laws should be so amended as to make them strictly answerable for their conduct in the premises."

The frequency of accidents on the trolley roads is attributed largely to the fact that the persons intrusted with the handling of the cars, in too many cases, have not been properly equipped for the performance of their duties. A bill is presented providing that no employee shall leave the service of the company except upon 15 days' notice, under the penalty of forfeiting his license, and thereafter debarring himself from re-employment; no employer shall discharge a man, except for cause, until after a 30 days' notice, subject to penalties, thus making lockouts impracticable.

The committee recommends that the State Board of Mediation and Arbitration be required to investigate all strikes and in each instance to fix the responsibility. This "will have the effect of enlightening public opinion and of making it known to the parties in interest that final judgment is going to be passed upon the justice or injustice of their demands, claims, or refusals."

It is noted that a resort to mandamus proceedings is practically useless, because of the allowance of 20 days in which to make a return to the alternative writ, and a reduction to 48 hours is recommended. Regarding municipal ownership the committee holds that the question is one too great and of too serious importance to be passed upon incidentally in an inquiry of this character.

The ownership and control of domestic railway corporations by other corporations not directly organized for exercising the franchises, and organized under laws which do not require their capital stock to be fully paid in money at par, are severely condemned, and a change in the law is recommended.

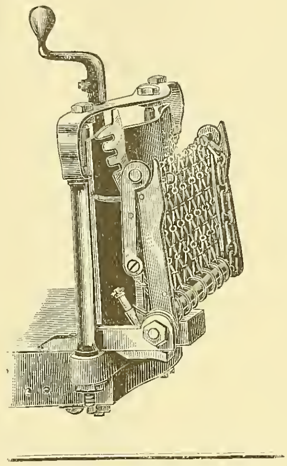
Appropriate bills are presented for carrying into effect all the committee's recommendations. The report also contains a history of the strike, of the negotiations between the corporations and the Knights of Labor, of the contracts between the railway companies and their employees, and histories of the several different systems upon which the strike occurred, with a discussion of the stock manipulation indulged in.

In conclusion, the committee says:

"We do not believe there is any radical legislative remedy for such conditions and disorders as have been described. They grow out of social facts and economic conditions which are too deep for radical cure by legislation. The only ultimate cure must come naturally from better relations and a greater feeling of sympathy between employers and employed. And the feeling of antagonism or difference of interest which too frequently prevails, cannot be removed so long as corporations are permitted practically through their own conduct and through the failure on the part of public officials virtually to make themselves superior to the law."

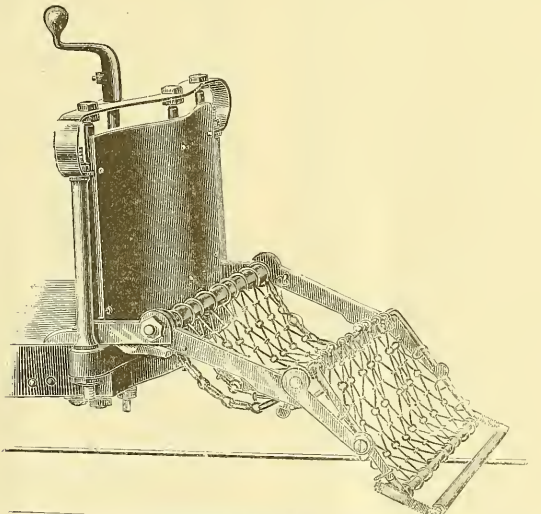
EDWARDS' CAR FENDER.

The accompanying illustrations represent the Edwards car fender which is claimed to be simple and efficient. The swinging frame or platform of the fender is balanced and pivoted on two iron arms, the front part being slightly heavier than the back portion: thus, by its gravity, it keeps closely to the ground. This swinging platform can be raised or lowered any desired distance from the ground by a thumb screw under the forward arm.



Edwards' Fender—Folded.

If the car oscillates the fender rises and falls with the car, and cannot be injured, it is stated, as the slight contact of the rubber roller with the ground, the weight being so light, raises it, but by its gravity it resumes at once its original position close to the ground. When a person is struck by this device he will fall, it is stated, as a natural result of the concussion, into the pocket of the fender, which is locked securely by an automatic latch. The fender can be adjusted to any car. The fender is made by Edwards & Co., of Brooklyn, N. Y.



EDWARDS' FENDER—READY FOR OPERATION.

MASSACHUSETTS STREET RAILWAY STATISTICS.[*]

PART III.

(*Concluded.*)

REQUISITES OF AN EFFICIENT FENDER.

"It is not necessary to describe in detail the various fenders recently presented to your board. Brief descriptions of those which were tested will be given in connection with the results of the tests. Neither is it necessary to enter upon a detailed discussion of the principles governing the action of fenders. A few brief considerations will be sufficient for the purposes of this report.

"The object of the fender is to prevent injury to a person who is struck while in any position, either standing or lying, by an electric car. A fender should aim not simply to prevent a person's getting under the wheels, but to prevent, if possible, his getting under the car; and should also, so far as possible, prevent his being injured by the blow. It is evident, therefore, that a fender should be somewhat elastic, so as to adapt itself to the inequalities of the roadbed, that some part of it should project in front of the dashboard, and that collision with the latter should be prevented by some elastic shield or buffer. Futher, in order that a person lying down or thrown down may not pass under the fender and be run over by the wheels, some portion of the fender must evidently be capable of being brought close to the ground.

"It is not practicable, as experience has shown, to have a fixed fender—that is, one which always maintains the same position—which shall run close enough to the ground to enable it to be serviceable in case it encounters small bodies lying flat. Inequalities in the roadbed and track, together with the motion of the car, render it impossible to run any part of a fender closer than within perhaps 2 inches of the rails: and even if such a fender is provided on its lower edge with a strip of rubber or some elastic material coming down closer to the ground, experience has shown that a small body is likely to be run over.

"It follows that the portion of the fender which is designed to prevent a car from running over a person lying down or thrown down, must be movable. Further, when this portion of the fender is lowered to the ground, it must be held down so that it cannot be raised sufficiently to pass over the body of a person, though it must possess sufficient elasticity to pass over ordinary obstructions in the track. There are several ways in which such a fender may be made movable:

"*First*, this portion of the fender may be arranged to run normally at a sufficient distance from the ground to clear all obstructions, but may be held by springs or otherwise in such a manner that, when it encounters an obstacle, the blow or pressure will force it downward to the ground. Fenders of this class, while they will work in many cases, are, in my opinion, open to the objection that, when they strike the obstacle, they are at their highest position, and in being forced down they may very likely crush a hand or limb or some part of the body; or, if the blow happens to be struck in precisely the right manner, they may even run over the body without being forced down. Moreover, if free to be forced down, they are equally free to be forced up. They are liable, therefore, to be raised so as to pass over an exposed body. If, however, a fender of this class has separate fingers or parts, which move independently, it seems probable that the above objections may be largely obviated. No fenders of this kind have been tested before your board.

"*Second*, a fender may be made movable by arranging it so that while ordinarily it runs at a sufficient height, a blow releases it and causes it to drop at once to the ground. With regard to such fenders the remarks just made may also apply. They are not likely, in my opinion, to prove efficient. It is essential to the most effective action that the fender *should be down before it strikes the obstacle.*

"*Third*, a fender may be made automatic by having a tripping device in front of it, which, upon striking the obstacle, lowers the fender. The fender may be lowered either by being released and dropping by its own weight, or by its own weight aided by springs, or it may be arranged so as to be locked down automatically as soon as it drops. Some fenders of this class are connected with the tripper by a rod in such a way that when the tripper is swung backward, the fender is lowered, while, when the tripper assumes its vertical position, the fender rises again. Fenders of this last description will, of course, fail to accomplish the results desired.

"*Fourth*, the fender may be lowered by the motorman by means of a pedal to be stepped upon, or a lever to be pressed with the knee, or some other device requiring a special motion on his part. Fenders of this kind are to some extent objectionable, because of the fact that they impose additional labor upon the motorman; and, in previous reports on this subject, I have been disposed to consider this point so important that fenders of other kinds have been preferred. Further experiments and consideration have, however, led me to modify my previous conclusions in this respect. Several of the most successful fenders which we have tested belong to this class; and, while it may be argued with reason that in case of accident the motorman has enough to occupy his attention in shutting off his power, putting on his brake and applying sand, it is nevertheless true that many motormen would be able to attend to dropping a fender in addition to their other duties, and would feel a greatly increased sense of security in the consciousness that the operation of an efficient fender was within their power and under their control. I have seen experiments with fenders of this kind in which the motorman forgot to drop his fender, and the dummy was run over. In some cases also the fender has not worked, though the motorman endeavored to operate it. While such cases are no doubt likely to occur, it seems probable that in the majority of cases, provided the dropping of the fender was arranged to be done by the motorman's foot or knee, he would be able to operate it successfully.

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[*] Abstract of the Street Railway Report of the Massachusetts Railroad Commissioners.

"There is another point which has an important bearing upon the use of some fenders of this kind, and that is, whether passengers are allowed to occupy the front platform. A fender operated by a pedal would probably be impracticable if the front platform were allowed to be crowded full of passengers, as is the case in Boston. This is not allowed in some cities, as, for instance, in Newark, N. J. A fender to be operated by the knee of the motorman appears in many respects the most practicable. When the direction of the car is reversed it can be covered by a box hung on the dashboard, so that it cannot be tampered with by passengers on the rear platform. On no account should a fender of this kind be operated by a separate handle.

"*Fifth*, the fender may be lowered by the operation of putting on the brake. A fender of this kind was the one recommended by the West End Fender Commission; but, as already stated, it has not been supplied, nor is such a fender anywhere in use, so far as I have been able to ascertain. The objections to it are that it is put down every time the brake is applied, and, if arranged to come down close to the track, it may be broken or worn out before being called upon to act in time of need. Its obvious advantages are that, although under the control of the motorman, it requires no separate movement on his part, and the harder he puts on the brake the tighter it will be forced down to the track. No fenders of this class have been presented to your board at this time.

"*Position of the Fender*.—A fender may be entirely in front of the car, or partly in front and partly under the car. It should not be entirely under the car, for the reason that such a fender would not satisfy the condition of preventing injury to a person who is run into while standing up.

"If the fender is entirely in front of the car it may easily be arranged so that it will in almost every case safely catch a person run into while standing up. There are numerous forms of nets and platforms which will satisfactorily accomplish this object.

"If there is no fender beneath the car, the front fender must of course be so arranged that it can be dropped to the track in case of emergency. Most of the fenders of this class depend simply upon the weight of the fender to hold it down, although in some cases springs are added. As already stated, it is very easy, especially upon an uneven pavement, for a fender to pass over a small obstacle, such as the body of a child. Attention has been called to the fact that the fender must be sufficiently elastic to pass over inequalities in the track and road-bed. In passing over an uneven road-bed it therefore acquires an up-and-down motion; and, if a child should happen to be lying in a slight depression in the track it is astonishing how a fender will in some cases pass over it. In the early experiments made by your board, and by the West End Commission. I have seen dummies run over by fenders which hugged the ground so closely that, until the fact was demonstrated, none of the witnesses would have believed it possible. The front end of a car has more vertical motion than the part nearer the truck, and there is here the greatest tendency for the fender to acquire a vertical motion.

"The difficulty, therefore, with fenders which are entirely in front of the car, is likely to be that, while they provide for the case of persons struck while standing up, they are liable to fail in the case of persons thrown down or lying down when struck Some fenders of this kind, however, by being made quite heavy in front, or by being held down, or by having the forward edge so arranged as to make it difficult to pass over a body, will undoubtedly do excellent service.

"*Wheel Guards*.—Perhaps the most common form of fender consists of two parts, one in front of the car, the other beneath the car. In this case, the part in front of the car should be designed to provide only for cases where persons are struck while standing up. This portion of the fender should therefore be free to rise and pass over an obstruction, or it should be permanently placed at a sufficient height to pass over a body. If the fender is so arranged, it is essential that it should be supplemented by a wheel-guard beneath the car; although, as the majority of persons are struck while standing up, an efficient forward fender will suffice to prevent the great majority of injuries. The portion of the fender beneath the car must, as has already been stated, be movable; and, from what has been said, it appears that it should be movable by either the third, fourth, or fifth of the methods previously enumerated; that is, it should either be automatic, or it should be operated by the motorman by a special lever or by the application of the brake.

"The experiments which have been made have shown that there are several forms of wheel-guard which can be depended upon with reasonable expectation that they will prove efficient. Whether these fenders should be automatic or should be operated by the motormen, is a question, I think, to be decided by the railway companies. It depends somewhat upon the character of the motormen and upon the character of the traffic and track.

"One further feature of the question deserves mention. Experiments have shown that when a dummy is run into by a car, especially if the dummy is lying on one rail or near one side of the track, it may frequently be swung around sideways in such a manner that, while thrown from the track, the legs or arms get in front of the wheels. Some form of protection along the side of the car, extending backward from the fender and inclosing the wheels, appears to be very desirable. Such a guard might easily be added to many of the fenders experimented with. In the case of the Bay State fender, the car was provided with such side guards and their efficiency appeared undoubted, constituting one advantage which this fender possessed, in the form in which it was presented to the board, over any other fender which was tried.

"*Conclusions*.—Replying specifically, then, to the terms of the order in compliance with which this investigation has been made, it may be stated:

"*First*, that several fenders have been devised which appear to afford reasonable protection in case of accident.

"*Second*, that the proper form of fender appears to be either a fender entirely in front of the car, which can be dropped and held close to the track in case of emergency, or, preferably, a combination of a fender in front of the car, designed to provide for cases in which persons are struck while standing up, with a wheel-guard beneath the car, which shall be dropped to the ground automatically or by the motorman, in case of an accident.

"*Third*, there are several fenders, differing in detail, which appear to be almost equally efficient, and, so long as the fundamental conditions necessary in a successful fender are fulfilled, it does not seem desirable that any action should be taken which requires the adoption by all the railway companies in the Commonwealth of one form of fender to the exclusion of all others. Some room should be left for the companies to exercise their judgment in the matter, and to take account of such special circumstances as may properly affect the choice.

"Of front platforms or nets designed to catch persons standing up, but to pass over persons lying down, there are many forms which will prove effective—so many, indeed, that it is not expedient to specify any by name. Considerations of simplicity, economy, and facility in applying them to cars, will govern the selection.

"Of front fenders designed to be dropped to the ground, and thus to provide for the emergency of running into a person lying down there are several forms which will be likely to prove generally efficient– among which may be mentioned the Foster & Brown (No. 5), the Rice (No. 8), the Clark (No. 16), the Hipwood (No. 24), and the Consolidated (No. 31). All of these, as well as some others, have good points, but most of them will need some modification before they can be considered as perfected. Most of them, too, have never been in use, and the dimensions and sizes, as well as the general arrangement, may require modification in the light of experience. The Foster & Brown is different in type from any of the others, consisting of a revolving cylinder with rubber fingers projecting therefrom. The fender is brought to the ground by the operation of the brake handle, and the cylinder is caused to revolve by two wheels which run along the ground, one on each side of the track. This fender gave unexpectedly favorable results in our tests.

"Of fenders which are normally held up by springs, and which yield to a blow or pressure and are thus forced to the ground, there are several forms—such as the Bridgeport (No. 32), the Lyford (No. 43), the Crawford (No. 44), and the Holmes (No. 51), which may be effective in many cases. I believe, however, as before stated, that a fender should be down before it strikes the body to be protected.

"Of wheel-guards only there are also a number which promise to give good satisfaction in operation—such as the Parmenter (No. 12), and the Bay State (No. 13), both of which gave very good results in our tests. A further feature of excellence in the Bay State fender was the side guards for protection from the wheels, extending from one end of the car to the other. Wheel-guards should, of course, be supplemented by platforms or nets in front of the car to catch persons standing up.

"Of combinations of front fenders and wheel-guards, several may be mentioned which are good in principle and likely to prove efficient in practice, though some of them need some modification in detail, namely, the Barrett (No. 11), the Darrach (No. 19), the O'Brien (No. 50), the Groshans (No. 56), and the Blakistone (No. 59). Of these, the one which has apparently been the best tested in actual service is the Blakistone, which has been applied to all the cars of the Central Railway in Baltimore, of which Mr. Blakistone is president. It will probably be adopted also in Washington."

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RECEIVER FOR THE MATHER ELECTRIC COMPANY.

In Hartford on Saturday last Judge Thayer appointed Charles M. Jarvis, of Berlin, receiver of the Mather Electric Company, of Manchester. Mr. Jarvis is a director of the company, and is the president of the Berlin Iron Bridge Company, of East Berlin. The Mather Electric Company has a capital of $216,000, and employs about 125 hands, with a weekly pay roll of $1,300 to $1,400. The appointment of a receiver is understood to be a friendly action in the interests of the company. The officers claim that its assets exceed its liabilities, and that a temporary financial embarrassment necessitated the appointment of a receiver. Judge Thayer issued an order permitting the receiver to continue running the works.

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EUROPEAN ELECTRIC RAILWAY STATISICS.

The following statistics showing the length and system of the electric roads of Europe and the power available for operating them have been compiled by *L'Industrie Electrique* of Paris:

	Length of Miles.	Power in Kilowatts.
Germany	64	2.934
England	45	2,993
Austria	21	1,115
Belgium	2	90
Spain	9	210
France	25	1,796
Italy	8	720
Russia	2	90
Switzerland	15	706
	191	10,654

The number of traction systems employed is as follows: Accumulator lines, 2; overhead trolley lines, 31; central rail lines, 8; underground conduit lines 2.

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FINANCIAL NOTES.

Braintree Street Cars Atttached.—The Braintree Street Railway, of Braintree, Mass., was tied up on Sunday last, as the result of an attachment placed on the cars.

Waco Plant to be Sold.—Under a decree of foreclosure the plant of the Electric Railway and Light Company of Waco, Tex., has been ordered sold by Judge Goodrich on May 7. The property is valued at $500,000.

Lynn & Boston Earnings.—During the month of March the earnings of the Lynn & Boston Street Railway Company increased about $5,000 over those of the corresponding month of 1894, when the earnings were $84,882.

Sale of the Attleboro (Mass.), Railway.—The Interstate Street Railway at Attleboro has been sold for $101,000 to E. R. Price, for the trustees of the syndicate which bought the Attleboro, North Attleboro & Wrentham road. The sum of $15,000 was deposited as a forfeit.

Philadelphia, Pa.—Simon Frieberger and Charles E. Hague, trading as the Wakefield Electrical Engineering Company, have sued Alvan Markle to recover $11,047.21, a balance alleged to be due for work done and materials furnished in constructing an electrical road from the town of Harleigh to Freeland, in Pennsylvania, for the Lehigh Traction Company. The plaintiffs allege that their bids for the construction of the road were accepted and that they began work; that later additional work was required of them, and they entered into an oral agreement with the agent of the defendant; that these changes entailed an additional outlay of money, which was understood and agreed to by the defendant. The total amount was

$75,054.92. They have been paid $64,007.71, and are now suing to recover the balance of $11,047.21, which they allege is still due.

Sale of Flushing Railway.—The Flushing & College Point Electric Street Railway has been sold by Richard P. Morie, Special Master, to Cravath & Houston, representing the reorganized company for $25,000. The sale was made to satisfy a mortgage held by the Atlantic Trust Company. and is subject to the lien of the Village of College Point for unpaid percentages of the earnings of the road (Flushing village made no claim for percentages), and also of the claim of the New York Power Company, which owns the engines, boilers, shafting, etc., in the power house. There were no other bidders. The road will operated by the new company, which promises improved service. The old stockholders will be interested to the amount of their bonds, and the $50,000 added by the reorganized company will be devoted to improving the service. One hundred and eighty thousand dollars has already been sunk in the property. Among those interested in the new company are Daniel Odem, E. Bayard Halstead, Paul D. Cravath, John W. Houston, V. K. McElhenny, Frank A. Dillingham, Philip F. Kobbe, Harvey Romer and Charles Snow Kellogg, of New York.

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NEW INCORPORATIONS.

Kingston, Ill.—The Rondout & Eddyville Railway Company, has been incorporated. The capital stock is $30,000, and the company proposes to build and operate a street surface road in Ulster County, three miles long. The promoters are W. T. Hiscox, P. C. Smith, R. W. Underhill, New York. N. Y.; J. V. Wilson, Brooklyn, N. Y.

Aberdeen, Wash.—The Aberdeen Land Company has been incorporated, with a capital stock of $25,000, to deal in real estate, build and operate street railways, electric light plants, water-works, sawmills, logging camps, steamboats and sailing vessels. The promoters are Richard T. Dabney, M. A. Dabney, Jos. B. Dabney, of Aberdeen, Wash.

New York, N. Y.—The Enbalm Conduit Trolley Company (incorporated in West Virginia) has been organized. The capital stock is $500,000. The company proposes to sell all kinds of machinery, inventions, and construct and equip steam and electric railways, etc. The promoters are: Glenn S. Smith, Brooklyn. N. Y.: Oscar A. Eubalm, New York City, N. Y.; Clarence E. Sherin, New York City, N. Y.

Rondout, N. Y.—The Oswego, Rondout and Eddyville Railway Company has been incorporated to operate a street railroad, three miles in length, from Kingston to the village of Eddyville, Ulster county; capital, $30,000. Directors, William T. Hiscox, Percival C. Smith, Gardner D. Hiscox, F. B. Gallagher, Frederick C. Beach, of New York City, Joseph V. Wilson, of Brooklyn; Albert Terry, of Kingston; Robert F. Tompkins, and John N. Cordts, of Rondout. The company's principal office will be in Kingston.

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NEWS OF THE WEEK.

Newburgh, N. Y.—There is talk of an electric railway from Chester to Newburgh.

Minneapolis, Minn.—The Selby avenue cable line will be transformed into an electric line.

Philadelphia, Pa.—On April 5 fire damaged the plant of Queen & Co. to the extent of about $3,000.

Louisville, Ky.—The Sixth street road of the Louisville Railway Company will be converted into an electric line during the spring.

Baltimore, Md.—It is announced that Jerusalem and Baltimore are to be connected by an electric railway over the Baltimore and Bel Air road.

Pittsburgh, Pa.—It is announced that the Citizen's Traction Company is contemplating running an electric railway from Brilliant to Pittsburgh.

Ottawa, Ill.—The Ottawa Electric Street Railway Company has stopped the operation of its cars. The company is desirous of selling out its plant to the city.

Montreal, Can.—Residents of St. Rose and St. Martin have petitioned the Montreal Park & Island Railway Company to extend its road through these municipalities.

Berwyn, Pa.—A charter has been granted to the Berwyn & Devon Passenger Railway Company. It is said the company intends to build a trolley line between the two places.

New York, N. Y.—The Metropolitan Traction Company has started its cars on the Lexington avenue road. Horse cars will be used until the cable is ready for operation.

Rome, N. Y.—Several trials of the Hardie compressed air motor have recently been made. A committee of citizens has been formed to solicit subscriptions for the stock of the company.

Chicago, Ill.—It is announced that the Metropolitan Elevated Railway will be in operation by May 15. More than 8,000 persons have already filed applications for employment with the company.

Chester, Pa.—The contract for the construction of the Delaware County and Philadelphia Electric Railway through Media, along Washington street, has been awarded to Johnson & Wickersham.

Brooklyn, N. Y.—It is probable that eventually steam will be discontinued on the Brooklyn & Brighton Beach Railroad, but the officials deny the report that the electricity is to be adopted this summer.

Laporte, Ind.—H. B. Tuthill and A. G. Tillotson, of Michigan City, have been granted a franchise by the County Commissioners for the right of way for an electric railroad between Laporte and Michigan City.

Chicago, Ill.—The city council of Evanston, a suburb 12 miles north of the city, has granted the North Shore Electric Railway Company the right to extend its line for a mile beyond the present terminus.

Bound Brook, N. J.—The New York and Philadelphia Traction Company has secured the right of way through Fanwood township, covering over a mile of the company's road between Somerville and Bound Brook.

Rome, N. Y.—The Rome City Street Railway Company has asked the city council for a franchise giving it permission to change its power from horses to electricity. The company has already obtained the necessary consent of property owners along its route.

Youngstown, O.—The Youngstown Street Railway Company has been asked to consider a project of building a street car line to Steelton. The company has taken the matter under consideration, and if a feasible route can be secured the company will, it is said, take advantage of it.

New York, N. Y.—A committee of aldermen recently visited Baltimore to examine the fenders in use on the cars of that city. They report that the life-saving appliances in use there have proved unusually successful and propose to recommend the adoption of similar devices in New York City.

Buffalo, N. Y.—The Buffalo Railway Company will add 40 handsome new cars to its already large equipment. A contract for them was made with the Laclede Car Company, of St. Louis, a short time ago, and it is expected that most of the cars will be turned out and shipped within a few weeks.

West Chester, Pa.—The holders of a charter for an electric railway between West Chester and Downingtown announce that it is their purpose to commence the work of constructing the line in a few weeks. As yet the council have not granted the projectors the franchises for laying tracks in the streets, but it is believed it will.

North Adams, Mass.—The Hoosac Valley Street Railway Company has nearly completed surveys for the proposed electric road between North Adams and Williamstown. The company has not yet secured the charter, but it will have little difficulty in doing so. The work of construction will probably begin as soon as spring opens.

Painesville, O.—The Cleveland, Painesville & Eastern Railroad Company applied last week to the Lake County Commissioners for a franchise for an electric railway between Painesville and the Cuyahoga County line. The road is to connect with the Euclid avenue line in Cleveland. It is probable that the franchise will be granted.

St. Louis, Mo.—The bill authorizing the Jefferson Avenue Railway Company to operate by electricity and fixing the city's compensation at 2 per cent. of the gross receipts after they reach $75,000, 2½ per cent. after they reach $125,000 and 3 per cent. after the receipts exceed $150,000, has passed the Assembly. The company must file a certified statement annually.

Worcester, Mass.—The North End Company will at once erect a power house. Up to the present time current has been furnished from dynamos owned by the company and located at the building of the Worcester Electric Light Company. The North End directors say they propose to build their proposed line through Prescott and North streets during the summer.

Albion, N. Y.—The Board on Railroad Commissioners has acted favorably of the application of the Northern Batavia & Oak Orchard Railroap Company for permission to operate a line between Batavia, Albion and Oak Orchard Harbor. Engineers have begun the survey of the proposed line, and it is expected that before the summer is over the road will be completed.

Frankton, Ind.—The Town Council has granted to Congressman-elect Charles L. Henry a 99 year franchise of the streets for electric street railway purposes. Mr. Henry proposes to put in a line from Anderson to Elwood, passing through Frankton, and connecting at Anderson with the Indianapolis-Marion line. Mr. Henry asserts that he will build the road if he can secure the right of way.

San Francisco. Cal. -E. P. Vining, general manager: J. L. Willicut, secretary, and H. H. Lynch, superintendent of construction of the Market Street Railway Company, were arrested on April 6 on warrants sworn out by Mayor Sutro charging them with beginning the construction of a street railway line without giving the Board of Supervisors 48 hours' notice, as required by an ordinance.

Boston, Mass.—The residents of the Oak Hill district, of Newtown Center, are considering the organization of a street railway company to operate between Newtown Centre and Newtown Highlands and either Bookline or West Roxbury. The proposed line would run through the heart of the Oak Hill district, which is now the most sparsely settled portion of the city.

Portchester, N. Y.—The directors of the Portchester, Rye & Mamaroueck Street Railway Company have elected the following officers: President, William Ryan; vice-president, John W. Lounsbury; secretary, H. M. Henderson, and treasurer, Josiah N. Wilcox. The board has voted to petition the town boards of Mamaroneck, Harrison and Rye and the village board of Portchester for franchises.

Brooklyn, N. Y.—Edward P. Mahoney, a motorman in the employ of the Brooklyn City Railroad Company, was acquitted of the charge of manslaughter in the second degree this week. Mahoney was indicted as the result of an accident by which a young man was killed by a Myrtle avenue car. The car, which was in charge of Mahoney, struck a wagon and one of the occupants was thrown out and killed.

Toronto, Ont.—The question of a passenger's right to ride on the front platform of a street car has become the subject of a lawsuit. David Lindsay claims that on Oct. 27 last he was forcibly put off the front platform of a car on the Toronto Railway after he had paid his fare. The car, he claims. was so crowded that he thought it was useless to attempt to get a seat. He denies that either the motorman or conductor asked him to go inside, but simply, by force, put him off the platform. He asks $500 damages.

Pittsburgh, Pa.—A street railway corporation to be known as the Monongahela Traction Company is now in process of organization. The incorporators are Alan D. Wood, John F. Davitt. L. G. Woods, Richard Flickling and J. Harper Adams This company is to operate the trolley line across the new Brown bridge at Homestead. It is really a part of the Homestead and Highland Traction Company, which, in conjunction with the Schenley Park and Highland line, known as the "Squirrel Hill line," is to form a continuous traction road from Oakland to Duquesne.

Red Bank, N. J.—It is probable that an electric road will be built between Red Bank and Long Branch by July 1. The matter has been under consideration for some time, but it has just begun to assume definite shape. The men principally interested in the road are New York, Brooklyn, and Newark people. Recently a special tug brought to Atlantic Highlands S. S. Whitmore, P. B. Purdy, J. F. Dobson, D. S. Arnott, and A. B. Eldridge, of Brooklyn; M. H. Hazzard, A. G. Greenberg, S. B. Dutcher, James Meyer, and Benjamin Frick, of New York; Robert Lightfoot, of Jersey City, and W. B. Williams, of Newark. The party drove in carriages to Red Bank, where they were met by representatives of the Board of Trade. They drove over the proposed route, which follows the turnpike to Pleasure Bay. The road is to cost $300,000.

Cincinnati, O.—The officers of the Cincinnati, Hamilton, Middletown & Dayton Street Railroad Company announce that the company proposes to construct a road parallel to the steam railroad from Cincinnati to Dayton. The directors of the Cincinnati, Middletown & Dayton Traction Company last week transferred to the former company all the franchises which it had secured. Gen. A. Hickenlooper, who is one of the promoters of the enterprise, states that within the year a line will be running to Hamilton. H. B. Morehead. the manager of the company, is quoted as saying that an 80-pound girder rail will be laid in the villages and T-rails on the country thoroughfares. Two power houses will be constructed along the line between Cincinnati and Hamilton, and five power houses will be built between Cincinnati and Dayton. It is stated that trains of two and three cars will be operated.

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PERSONALS.

Mr. J. L. Hall, of Springfield, Mass., has been appointed superintendent of the Hartford, Manchester & Rockville Electric Railway Company.

Mr. C. L. West, Superintendent of the City Passenger Railway Company, has accepted the position of Superintendent of the North End Street Railway, of Worcester, Mass.

TRADE NOTES.

Car Contract Awarded.—The Milwaukee Street Railway Company has placed an order with the Pullman Company for 12 street cars.

John Wood. Jr.'s Foundry and Machine Works., of Conshohocken, Pa., shipped recently 1.000 H. P. of patent water tube boilers to the Pottsville Traction Company. The company has just received an order from the Norfolk & Ocean View Electric Railroad for 1,000 H. P. of boilers, a 120 foot stack and 100,000 pounds of castings.

New Contracts of the Berlin Iron Bridge Company.—The new boiler house for the Hartford Gas Light Company, Gen. John P. Harbison, general manager, at Hartford. Conn., has been completed by the Berlin Iron Bridge Company, of East Berlin, Conn. The roof is anti-condensation. The New Jersey Magnetic Concentrating Company is putting up a new dryer plant at Lyon Mountain. N. Y., which will be entirely of iron. designed and built by the Berlin Iron Bridge Company.

Risdale & Lewis, of 39 and 41 Cortlandt street, New York. have just completed two portable electric light plants of thirty 2,000-C. P. arc lights each for the Buffalo Bill Wild West Company. These plants are to be used on the road. and their compactness will admit of their being used for one-night stands, as the plant complete, of 60 lights, can be erected and the lights turned on in about two hours. A public exhibition of the plants was recently given at Ambrose Park, South Brooklyn.

The Genett Air-Brake Company, of 33 Wall street, New York, has just issued a new catalogue which describes thoroughly the Genett Air-Brake for electric and cable cars and trailers. The catalogue is thoroughly illustrated, and contains much matter which will be found of great interest to street railway men. The company has also issued the paper by Edward J. Wessels, the New York manager of the company, that was presented at the last convention of the American Street Railway Association. It is entitled "Power Brakes vs. Hand Brakes," and describes in an admirable way the advantages connected with the use of a reliable air-brake on street railway cars.

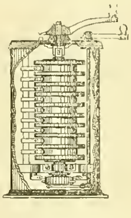
RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued April 2, 1895.

536,611. Cable Railway; Charles I. Earll, New York, N. Y. Filed June 18, 1894. A revoluble peripherally-spiraled cable-shifting carrier is fixedly supported as against vertical movement below and adjacent to the slot and adapted for shifting the cable from a point below the cable car grip to a point in horizontal alignment therewith. Means are provided for changing the position of the grip and cable-carrier laterally relatively to each other.

536,637. Snow Sweeper; Francois Lucas, Munson's. Pa Filed Dec. 27, 1894. A receptacle is formed into a depending hopper at one end and provided with perforations in its bottom, whereby salt or like material. adapted to melt snow and ice, placed therein, may filter through.

536,664. Car Fender; Charles B. Stuart, Boston, Mass. Filed Nov. 17. 1894. The frame is provided with the cross piece and a floor. The spring platform is supported by the floor, a swinging platform being hinged to the cross piece. A cord connects the upper surface of the swinging platform with a spring secured to the floor. A spring latch secured to the swinging platform normally locks the swinging platform in line with the fender frame. A cord passes from the latch under the front edge of the spring platform and is secured to the frame, whereby the depression of the spring platform retracts the latch and allows the swinging platform to be raised.

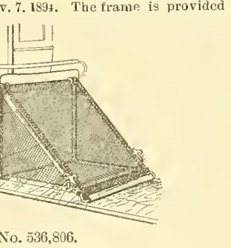


No. 536,794

536,665. Car Fender; Worthington B. Thomas, Philadelphia, Pa. Filed Nov. 19, 1894. The fender comprises a frame having a cushioned carrier apron with a wire guard or dash, a trigger frame arranged in advance of the apron and actuated by the impact of an object against the same to disengage locking devices, a cam, an actuated roll brought into engagement with the cam, intermediate mechanism connected with the apron and cam and means for raising and lowering the apron.

536,704. Safeguard for Cable or Electric Cars; Geo. Rischmuller, San Francisco, Cal. Filed Feb. 21, 1891. This fender is the combination of a bar having a cross piece at its front and a counter weight at the other end and a slit in the center, a chain being fastened to the bar and a lever to operate the mechanism.

536,708. Car Fender; Charles P. Stimpson, Troy, Assignor of one-half to Phebe R. Gunnison, Lansingburg, N. Y. Filed Nov. 7. 1894. The frame is provided with a screen at its front end, and at its rear end with journals on which its front end may be raised or depressed. A finger-form holder pendent from the car bottom, is slotted upwardly from its lower end, and adapted to receive a cross-bar of the frame when the latter is raised. A keeper hook is pivoted at its upper end, and where projected downwardly is adapted to receive a holder-bar when the frame is raised. A hook proper upon one of the sides is adapted to under-run and hold the frame cross-bar when within the holder slot. A tripping bar is arranged in advance of the screen, and is connected with the holder-bar by means of rods passing through the screen frame sides to connect with the holder-bar, whereby when the tripping bar comes in contact with an object, the holder-bar will be moved rearwardly to trip the keeper-hook and allow the frame to descend on the track,



No. 536,806.

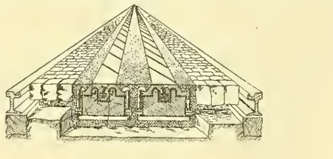
536,734. Railway-Switch Work; Arthur J. Moxham, Johnstown, Pa Filed March 30, 1894. This consists of a metalic structure which is provided with a pocket adapted to receive a plate upon which is formed the point, and provided on its exterior with projections which correspond in cross-section with the rail of the remainder of the switch, and to which projections the rail is abutted and integrally secured.

536,735. Railroad Switch Work; Arthur J. Moxham, Johnstown, Pa. Filed March 30, 1391. The body portion has a pocket and rail portions are secured at its end A plate is adapted to enter the pocket and has track surfaces upon its upper side and studs or pins upon its lower side, the studs entering sockets in the body portion and being held therein by a filling material inserted in the pocket.

536,794. Electric Controller; Gustaf Valley, Cleveland, O., Assignor to The Steel Motor Company, same place. Filed Dec. 3, 1894. Claim 6 reads as follows: "The combination with the frame and electrical connections of an electric controller, of a roller composed of a number of sections provided with the proper contact pieces and adapted to interlock laterally with each other, a central shaft carrying top and bottom clamping plates which interlock with the end sections of the drum. a pivot-piece secured in the top of the case and engaging the operating handle and having a socket to receive the top of the shaft, and a detachable bearing for the lower end of the shaft." (See illustration.)

536,795. Switch for Street-Car Controllers; Gustaf Valley, Cleveland, O., Assignor to The Steel Motor Company, same place. Filed Dec. 3, 1894. This is the combination on a multipole switch of a disc of insulated material and means for rotating the same There are curved conducting pieces imbedded therein at different levels. having both ends protruding to form contact points. The diametrically opposite conducting pieces are upon the same level and have their points alternating with those of the pieces upon a different level. The spring contacts are arranged around the disc at intervals equal to those of the contact points and in series corresponding to the different levels of the projecting contact points and in position to be engaged by the points.

536,803. Contact Finger for Electric Controllers; Samuel Harris, Cleveland, O., Assignor to The Steel Motor Company, same place. Filed Dec. 5, 1894. The controller finger has the contact shoe rigidly affixed to an endless elliptical spring of flat metal which is free to flex in any direction and to which is rigidly affixed a carrying-piece.



No. 536,855.

536,806. Fender or Life-Guard; Henry Henthorne, Newark, O. Filed June 25, 1894. This patent covers the combination of triangular frames located a suitable distance apart, pivoted bail-shaped frame, piece of reticulated, netted or perforated fabric or material, roller curtain or apron, chains or flexible connections provided with dogs or projecting members, spring-actuated spools, drums or devices, and locking-levers or latches having arms. (See illustration.)

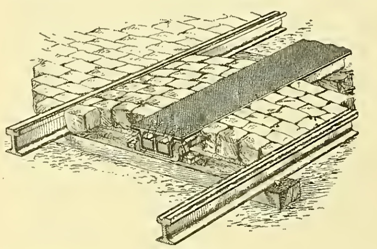
536,828. Supply System for Electric Railways; Albert C. Crehore, Ithaca, N. Y. Filed July 22, 1893. Sections of working conductor are normally disconnected from the line, and electro-magnetic switches connect the several sections with the line. A trolley or current collector is carried by the car and is adapted to preserve connection in passing from one section to another. The switch operating magnets are energized by current in a branch from the motor circuit around the motor over an auxiliary conductor which is normally disconnected from the power line on the line of way, but is continuously connected therewith while the car is passing over a section of working conductor.

536,852. Car Fender; Obe Cullison. York, Pa. Filed Oct. 19, 1891. This is the combination with the car, of sliding rack bars, a cross shaft provided with pinions which engage with the rack portions of the bar, and also with a notched disc, a fender carried by the bars, mechanism tending to move forward the bars and the fender, a catch for holding them in a rearward position, a trip for releasing from the catch upon the fender striking an object, and a lock for positively holding the fender and bars in their rearmost positions, consisting of a pawl, adapted to engage with the said notched disc.

536,855. System of Electrical Propulsion for Railway Cars; Leon Dion, Natick, Mass. Filed June 14, 1891. The closed conduit has a cover or top made in sections insulated one from the other and formed of metal which is capable of electrical conductivity, but not susceptible to magnetic attraction. A main electrical conductor and an auxiliary conductor are both inclosed within and insulated from the bottom of the conduit, the auxillary conductor being superimposed upon the main conductor and composed of members or portions of conducting material, the connected members, or portions, of the auxiliary conductor being susceptible to magnetic attraction. (See illustration.)

536,875. Switch-working Mechanism; Edward J. Ill. Jersey City, N. J. Filed Feb 2, 1895. A revoluble screw shaft moves the switch point and a sprocket wheel and chain mechanism turn the screw shaft first in one direction and then in another, means for actuating the sprocket wheel and chain mechanism from a passing car being provided.

536,915. Supply System for Electric Railways; John M. Byron, New York, N. Y. Filed June 16, 1894. A trolley rail is composed of sections insulated from each other, and a trolley contact is arranged between the sections. The switch consists of oppositely-arranged magnets. There are pivoted double armature, a sector-shaped arm, pendent from the armature and swinging with it, and having a portion of its arc insulated, two switch contacts on which the arc slides, and electrical connections between all the aforesaid contacts and other parts mentioned.

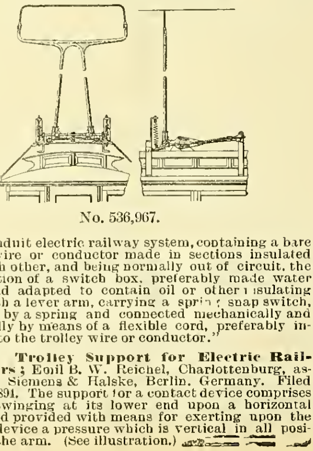


No. 536,918.

536,918. Closed-Conduit System for Electric Railways; Edwin D. Chaplin and Leon Dion, Natick. Mass. Filed June 14, 1894. The conduit, or subway, is entirely closed at all points, and a main conductor or feeder is arranged therein. An auxiliary conductor consists of a series of strips, or filaments, having conductivity and susceptible to magnetic attraction, their ends being overlapped and connected by a slot in one and a tongue and cross-head on the other. (See illustration.)

536,923. Safety Device for Electric Railways Having Sectional Conductors; Leon Dion, Natick, Mass. Filed June 14, 1894. This is the combination with a car taking current from a series of contact-plates, of electrically operated signals arranged at both ends of the car, a centrally supported bar, and devices mounted upon the ends thereof and electrically connected to the signals.

536,952. Conduit Electric Railway; Tyre C. Hughes and Arthur W. Adams, St. Louis, Mo., assignors of one-half to Ewing Hill and E. C. Smith, same place. Filed Feb. 12, 1891. Claim I. reads as follows: "In a conduit electric railway system, containing a bare trolley wire or conductor made in sections insulated from each other, and being normally out of circuit, the combination of a switch box, preferably made water tight, and adapted to contain oil or other insulating fluid, with a lever arm, carrying a spring snap switch, actuated by a spring and connected mechanically and electrically by means of a flexible cord, preferably insulated, to the trolley wire or conductor."



No. 536,967.

536,967. Trolley Support for Electric Railway Cars; Emil B. W. Reichel, Charlottenburg, assignor to Siemens & Halske, Berlin. Germany. Filed Oct. 25, 1891. The support for a contact device comprises an arm swinging at its lower end upon a horizontal pivot, and provided with means for exerting upon the contact device a pressure which is vertical in all positions of the arm. (See illustration.)

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Interest in the Fender Problem.

Interest in the fender problem does not abate, and week after week new efforts to solve it are patented. Last week seven patents for fenders were issued and the number is only one less this week. The total number of patents for inventions of this sort must now be in the neighborhood of 400. All sorts of men apparently have become convinced of the fact that a fortune awaits the inventor of a successful fender for street cars, and quite a large proportion of the number are evidently persons who have not the slightest conception of the conditions under which street cars are operated on city streets. To say that a very large number of the fenders that are invented and patented are impracticable is to put the case very mildly. While there is a considerable amount of money thrown away on patenting fenders of useless and absurd types, we are glad to see so great an interest taken in the problem. It ought to lead eventually to the production of a far better fender than is now available, and that is what some hundreds of companies are waiting for.

Maintenance of Order in Street Cars.

A decision just handed down by the Maine Supreme Court is a triumph in the cause of decency. It is in effect a vigorous and practical condemnation of the too common practice of using foul language in street cars. A Rockland man addicted to this habit fell foul of a conductor who refused to allow the passenger to persist in this offence against decency. When he insisted upon making a nuisance of himself, the conductor, it is gratifying to relate, promptly threw the offender off the car and the latter was obliged to walk home His punishment was immediate and severe, for illness, resulting from the exposure, kept him within doors for a considerable time. He brought suit against the street railway company, asking damages to compensate him for his sufferings, and it is a surprising fact that Maine jurors, supposed to be more than ordinarily sharp, were fools enough to find a verdict in his favor. The Supreme Court brushes this aside, and in its opinion expresses some vigorous and common sense sentiments that must meet the warmest approval of street railway managers, and, indeed, of all those who believe in public decency. The Court says in substance that injuries sustained as a result of ejectment from a car for swearing and using bad language constitute a poor foundation on which to rest a suit for damages The truth of this assertion is so evident that no argument is necessary to support it. This decision is one that is needed, and we trust that it will attract the attention that its importance deserves. We think that as a rule conductors are far too lax in the maintenance of order in their cars. They allow drunken men to make nuisances of themselves and permit blackguards to swear to their heart's content without interfering with them, even when women are numbered among the passengers. The fact is that the offender is more often brought to book by a passenger than by an employee, although it is the latter's duty to see that passengers riding in his car are not subjected to this sort of experience. It is easy enough to understand why conductors are loath to act. It is not that they are cowardly; the reason is that they are afraid of involving themselves in trouble. This should not be the case. The companies should cause their employees to understand thoroughly that they will receive moral support in cases of this sort. Offenses of this kind would then be encountered much more seldom. We have no doubt that the result of the suit will cause the street railway companies in Maine to act much more fearlessly in the maintenance of good order on their cars, and we trust that their example will be followed in other States.

Fight Against Connecticut Trolley Lines.

The steam railroad companies are attempting the impossible in Connecticut by endeavoring to prevent the spread of electric roads. The latter furnish cheap, frequent and convenient service suitable to the requirements of the public, and the people will not permit such obstacles to be placed in the path of progress as will check permanently the development of these enterprises. Just at the present time the electric railway companies are having a hard fight of it and the successes have been scored by their opponents, but no one can believe that the setback will be more than temporary. The law as it stands seems to be rather against electric railway development. The general railway act of 1893, passed in the interests evidently of the steam roads, provided that no steam line should be paralleled by an electric road unless the latter was found by a court to be required for public convenience. According to the last decision under this law handed down last week public convenience is easily provided for. If a decent steam service exists between two points the paralleling road is not needed by the public, according to the court. This is certainly a narrow view. An electric railway furnishes a different kind of a service; the cars make stops as required, and meet a demand for short distance transportation such as the steam roads cannot supply. It does not follow, therefore, that in a case where a steam road exists that public convenience would not be further provided by a parallel electric line. As the Springfield *Republican* says, "The steam roads in Connecticut are pressing their claims too far. They might as well ask to be protected against every improvement and invention designed to make transportation more cheap and available than they with their older appliances can give." In view of the great popularity of these local roads with these cheap, frequent and convenient service it is probably safe to assert that their multiplication cannot be effectually prevented for any considerable length of time. If the law, as it is interpreted, stands in the way it will be modified, for the legislature has a wholesome respect for public opinion in that same State of Connecticut. As for the railroads, they cannot expect to check progress in this age and they must rest content for the time being with the long-distance traffic, though the New York *Sun* says they have no right to complain if they lose that in the course of time. "Did they not," asks that paper, "drive out of business the old stage coaches by which folks traveled, and the wagons by which goods were transported, and the horseback carriers who swept over the highways with their mail bags? Indeed, they did; and thus they threw hundreds of men out of employment in Connecticut, besides reducing the price of horses. They did not care a copper how many stage drivers were knocked out by steam, or how many country inns were ruined by the rail, or how many stables were closed because animals were superseded by engines. Not a copper, so long as they drew their dividends and rose to the top of society."

PHILADELPHIA STREET RAILWAYS AND THE INCOME TAX.

Perhaps the officials of the passenger railways of Philadelphia had as much trouble as any one in deciding the proper manner in which to make the income tax return of their respective companies.

Like many other corporations, as well as individuals, the passenger railway companies waited for the decision of the Supreme Court before considering the matter of making a return. The decision has complicated matters, and wedges are being prepared by the companies to be driven into the cracks opened by the decision in an effort to split a few more sections off of the income tax law, says the Philadelphia *Public Ledger*.

The People's and Electric Traction companies will not have much trouble in making their return. Last year was occupied by those corporations in the work of reconstruction, in which large sums of money were expended. Their income for last year, it is assumed, was nothing, for no dividend has yet been declared by either company. The Philadelphia Traction Company is paying dividends, and consequently will have some tax to pay. The difficulties arise with the leased lines and, very naturally, their officials intend to take advantage of any exemption which the law can be construed to allow.

In the first place, the Supreme Court decision declares the taxation of rents from real estate to be unconstitutional. Every leased company owns more or less real estate in the shape of car houses and stables. For the use of this real estate, as well as for the use of other property and franchises, the lessee company pays a fixed sum per year. In most leases it is called a rental. In some other terms are used, but it is held that so far as the real estate is concerned the amount paid the lessor is rent by whatever name it is called.

Not all the companies have made their returns, but most of those which have, and perhaps all of them, it is understood, have placed a valuation on their actual real estate, such as car houses, and deducted from the gross rental paid by the lessee a proper proportion, which is set down as rental from real estate and exempt under the decision of the Supreme Court, or is not returned at all, on the ground that the unconstitutional parts of the law were erased by the decision. The leased lines of the Electric and People's Traction Companies, it is stated on excellent authority, have or will make deductions on the ground stated. All the power stations are owned in fee by the traction companies.

Another point has been raised of a far-reaching character. It is, that the roadways of the companies, their franchises, in fact, are real estate, and as they are leased at a fixed rental, the proportion of rental derived from these franchises is not taxable. Upon this ground, the only taxable property of the leased passenger railways is their personal property, such as cars, and, as most of the cars are new and belong to the traction companies, the leased companies are practically exempt from the tax.

This point rests upon the fact that, in Philadelphia, the passenger railways are required to pave and repave the streets upon which they run, and keep the pavement of the same streets in repair, in consideration of being given the right to use them. The question is raised whether this should be treated as a rental to the city for the use of the streets, and, if so, if the streets are not real estate. If the streets are real estate, the use of which is rented from the city, then, it is argued, the rental paid by the lessee companies to the companies whose property and rights they lease is rental on real estate, and, therefore, not subject to the tax.

Whether or not this point is made, or will be made, in any of the returns which have been filed or will be filed, is not positively known, but it is said that one of the grounds of protest which will be made by several of the companies against the payment of the tax will be that stated. It is believed that most of the companies will make a formal protest against the payment of the tax.

RESULTS OF SWEARING IN STREET CARS IN MAINE.

The Supreme Court of Maine believes that order should be maintained in street cars. It holds that a passenger who offends public decency by using foul language should be ejected. The views of the court in this regard are expressed in a decision in the case of Clarence L. Robinson against the Rockland, Thomaston & Camden Street Railway Company, of Rockland. In November, 1893, the plaintiff was ejected from one of the defendant's cars. He was on his way from Rockland to Thomaston and he had paid his fare. About half the passengers in the car at the time were women. While talking to the conductor the plaintiff became profane and continued swearing after the former had warned him that he must stop or leave the car. The conductor, decent man that he was, then promptly put the offender off the car. The latter was obliged to walk two miles, and in consequence contracted a cold and was seriously ill. He brought suit against the company and an idiotic jury gave him a verdict for $1,187.27. The Supreme Court sets aside the judgment. The opinion was written by Judge Watson and is concurred in by all the justices. The court says:

> In this State, the use of indecent or profane language in a street railway car is a breach of the peace. It is a crime for which a person may be punished by fine or imprisonment. And the conductor of the car may immediately arrest any person guilty of such a breach of the peace and hold him till a warrant can be obtained, or he can be placed in custody of the proper officers of the law. Or the conductor may remove a person guilty of such a breach of the peace from the car. And in the exercise of this right, the conductor acts as a public officer. He is not to act or refuse to act at the dictation of his own will and pleasure. When indecent or profane language is being used in his car, it is his duty to check it, and he will be guilty of a breach of duty if he fails to do so.
>
> And if, in a car filled with passengers, nearly one-half of whom are ladies, a man in earnest conversation undertakes to emphasize his statements as some men are apt to do, by saying, "By God" it is so, or "By God" it is not so, the law makes it the duty of the conductor to check him, and if the latter denies his guilt, and upon being assured by the conductor that he was guilty, flies into a passion and calls the conductor a "damned liar," it is the opinion of the court that he may be rightfully removed from the car. Not as a punishment for his insult to the conductor as an individual, but to vindicate the authority of the law, which forbids the use of such language in a street car or any other public place, where women and children have a right to be. * * *

We hope to teach passengers to treat the servant of railroads with civility. To call a street railroad conductor, who, in a crowded car, half-filled with ladies, is endeavoring to maintain order and suppress profanity, "a damned liar," is a poor foundation on which to rest a suit for punitive damages.

RECEIVERSHIP FOR THE LAKE STREET ELEVATED OF CHICAGO APPLIED FOR.

A receiver of the Lake Street Elevated Railroad Company of Chicago was applied for last week by William Ziegler, of New York, a large stockholder, and until recently one of the directors. The bill charges the present board of directors with attempting to wreck the road and alleges that the parties behind the directors, and who own a majority of the stock of the road, are identified with the management of the West Chicago Street Railway Company, controlled by Charles T. Yerkes, and that the recent conduct of the board of directors has been subversive to the dictates of the alleged influence behind the board. John J. Mitchell, president of the Illinois Trust and Savings Bank, is alleged to be the personal representative of the street railway interests, and it is claimed he purchased the majority of the stock of the elevated road. Since the control of the road passed into the hands of the present management Mr. Ziegler charges the latter with having given its rights to an extension on Lake street from Market street to Wabash avenue, to the Union Elevated Company, which corporation, he avers, is controlled by the West Chicago Street Railway Company. Several instances are cited in which Mr. Ziegler declares the interests of the elevated road have been set aside by the directors, and he finally charges that the board of directors is fraudulently endeavoring to scale down the bonds and is representing that the company is insolvent. An injunction is asked, restraining the directors of the road from carrying out the deals in which Mr. Ziegler claims the interests of the company have not been properly protected.

D. H. Louderback, the president of the Lake Street Elevated, has made the following statement in regard to the charges made by Mr. Zeigler:

> "The allegations made by Mr. Zeigler are without foundation in fact. The road, since we came into possession of it, has been operated in the best interests of all the security holders without exception, as it will be in the future. No contracts of any kind have been made which are not vastly to the interest of the Lake Street road and the holders of its bonds and stock, and nothing will be done which is not for the benefit of both securities. Mr. Ziegler, when last here, not only agreed that the scaling of bonds was for the best interests of both the security holders, but he advocated that they should be scaled at 50 per cent., and it was only when he found out since that he could not compel our interests to purchase his bonds and stock and that of his immediate friends at a price much higher than other security holders were to receive that he started this suit. Every security holder in the Lake Street road, as far as we are concerned, will be treated exactly alike. Neither Mr. Yerkes nor the gentlemen associated with him can afford to do anything in this community which is not straightforward, and their past record is the best proof of this assertion. They are builders up of property and not wreckers."

DECISIONS AGAINST CONNECTICUT RAILWAY COMPANIES.

In the Superior Court in Hartford last week Judge Hall handed down a decision of great interest to a considerable number of electric railway companies which are proposing to construct roads in the near future. The decision related to the parelleling of existing steam roads by electric lines. Under the general railroad law of 1893 no street electric line can be built to parallel a steam railroad until a demand for such road as a public convenience and necessity can be shown to the satisfaction of a superior court judge.

The case to come before the court was that of the New Britain Street Railroad Company which wanted to extend its tracks 10 miles to Hartford. It was opposed by both the New York, New Haven & Hartford and the New York & New England railroads, on the ground that public convenience and necessity did not call for the construction of this road.

On behalf of the company it was urged that the enterprise did not come within the application of the law, for the reason that part of the route was through private lands and not on the highway.

Judge Hall says that it is not within his province to decide whether or not the proposed layout between New Britain and Hartford is "in the highway," within the meaning of the law; nor whether or not the proposed layout parallels either the New York, New Haven & Hartford or the New York & New England roads. The only question under the act of 1893 which can be decided in this case upon this application is: "Does public convenience and necessity demand the construction of this line?" He finds that this claim is not supported by the evidence, but, on the contrary, that the two steam roads between New Britain and Hartford furnish sufficient accommodations for travelers. The decision allows an extension, however, from New Britain to Berlin, where there is, in the opinion of the Court, a demand for accommodations not provided by the steam roads.

The New Britain company has already expended about $3,000 on the extension to Hartford and has a bill pending in the Legislature for a special charter for the extension. This was presented in anticipation of an adverse decision in the courts.

The railroad committee of the Connecticut Legislature made a ruling unfavorable to the electric railway interests last week. At a hearing on an application for a charter for an electric line from New Haven to Derby, it was represented by the projectors that it would be built almost wholly over private lands purchased by the company. Counsel for the Consolidated Road promptly raised the objection that if this was the case the road would not be a street railroad coming under the street railroad law of 1893, but must be regarded as a steam railroad enterprise, subject to the general railroad law of the state. Therefore, it would be required, as a condition precedent to the hearing of its application, that engineers' maps of the layout and specifications as to cost, etc., be filed. The committee went into executive session, and announced later that this must be regarded as practically a steam road and subject to the restrictions prescribed by the general railroad law as to maps, etc. Counsel for the electric line protested, but the committee held to its position and appointed a further hearing for April 30, when the application will be again considered if maps and specifications are produced.

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CHICAGO ELECTRIC CONDUIT ROAD.

The Baird Electric Conduit Company has just been organized in Chicago, with a capital stock of $5,000,000. The company is organized to install the electric conduit system of G. E. Baird. The company is desirous of securing permission to install the system on the Indiana avenue line of the Chicago City Railway Company. In the Blair conduit system two parallel lines of pipes extend along the bottom of the conduit, and boxes are inserted in the lines of pipe at intervals of about 25 feet. The ends of the pipe are screwed into the ends of the boxes so as to form water-tight joints. Each line of pipe with its connecting boxes forms a continuous passage, and in the two parallel passages thus formed are inclosed the supply and return conductors of the system. Each of the wires is thoroughly insulated, except at points within the boxes, where it has contact with one pole of a switch. Over this hangs the other pole of the switch connected to the free ends of the oscillating contact levers supported on a transverse shaft which extends through and is journaled in the inside walls of the boxes. On the ends of the shafts are secured operating levers, each lever having a roller set in its free end. These rollers or trolley wheels, are thoroughly insulated from the levers, an insulated wire passing through a chamber in the levers and connecting the rollers with the free end of the switch which connects the trolley with the switch.

One car of each train is provided with a motor and a carriage, or two contact bars, sled shape, lying within the conduit and supported by arms extending down through the usual slot. The contacts are of a conducting metal and are in electrical connection with the motor. The carriage or contact bars are of a length slightly greater than the space between the boxes, so at least one set of trolley wheels must be always held in contact with the wires by the carriage of each motor-car. The carriage is composed of two contact bars, and each of them is a broad and comparatively thin strip of metal, set vertically and having great lateral flexibility, and the ends of each pair of bars are provided with travelers, which rest against light guide rails extending along the conduit. The contact bars are thus held constantly in line with the track, whether straight or curved, and, in fact, they easily and readily follow any curve around which a car can pass. The boxes are hermetically sealed and the system, it is claimed, is thus thoroughly protected against leakage by reason of water and against dirt and many other obstructions.

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Milwaukee, Wis.—The Milwaukee & Wauwatosa Motor Railroad Company proposes to extend its line to Waukesha, a distance of 15 miles. Practically all the right of way along the entire distance has been secured. It is stated that the line will be electrically operated and that trains will be run during the summer months at frequent intervals.

TROLLEY USED FOR ELECTRIC CAR LIGHTING ON THE NEW YORK AND BROOKLYN BRIDGE.

The first form of trolley used in connection with the system for lighting by electricity the cable cars on the New York and Brooklyn Bridge has been abandoned. This form is similar to the ordinary type of trolley with the length of pole reduced to about 2 feet, and an illustration of the appliance appeared in the STREET RAILWAY GAZETTE of March 16. It was found that the wheel would not follow the wire, owing to the shortness of the pole and the thrust of the car at switches. The form of trolley shown in Fig. 2 is now in use. This resembles the type used on some of the electric railway systems in Europe. It consists of a triangular wire frame which is held in the pole socket of the trolley base. The upper part of the frame which is pressed against the wire carries a brass roller 18 inches long. The contact thus effected, partly sliding and partly rolling, seems to meet all the requirements.

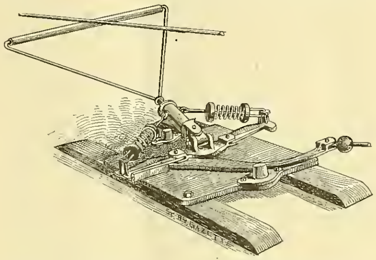

Fig. 1.—Trolley Used for Electric Lighting on the New York and Brooklyn Bridge.

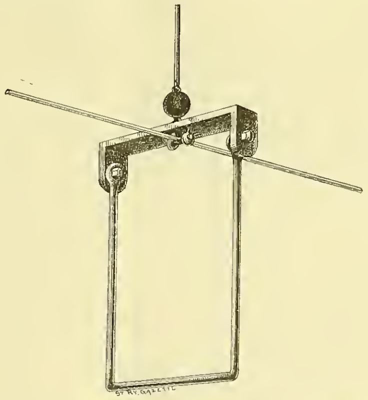

Fig. 2.—Swinging Stirrup Used on Brooklyn Bridge.

The plan of reversing the trolley at the terminals at first consisted in merely raising the wire gradually until the trolley could stand upright, when it was thought it would reverse itself as the car changed its direction. In practice it has been found necessary to add the swinging stirrup shown in Fig. 2, which trips the trolley as it passes under it.

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RESULTS OF ELECTRIC RAILWAY OPERATION IN CONNECTICUT.

At a recent hearing before the Railroad Committee of the Connecticut Legislature counsel for the New York, New Haven & Hartford Railroad Company submitted a statement showing the losses in local passenger traffic, due to the competition of parallel electric lines. The falling off in traffic is even greater than has been generally realized, and in view of the fact the opposition to the further construction of competing electric roads is not surprising. The comparative statement shows the number of strictly local passengers carried by the steam road between the stations named during the period of the six months ending with February, 1894, and 1895, with the percentage of decrease for 1895 as compared with 1894; together with figures showing the approximate distance between these places:

Six Months.	1894.	1895.	Dec. per cent.	Miles.
Bridgeport and Stratford......	23,547	7,068	.69	3
N. Haven and West Haven....	8,234	6,649	.19	2
N. Haven and East Haven.....	5,619	2,203	.60	5
Meriden and Yalesville	13,768	3,002	.78	3
Hartford and Rocky Hill......	7,558	6,567	.13	9
Union City and Waterbury....	23,124	3,107	.86	4
Naugatuck and Waterbury....	18,672	6,051	.87	5
New Haven and Woodmont..	8,580	3,275	.61	6
Bridgeport and Southport.....	20,748	15,617	.24	7
Meriden and Wallingford......	34,237	24,548	.28	6
So. Norwalk and Rowayton...	33,606	21,814	.35	3
So. Norwalk and Winnepauk..	808	102	.87	1
Derby and Ansonia.............	2,479	2,225	.10	2

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BONTA ELECTRIC EMERGENCY BRAKE.

A simple and effective device designed to increase the safety of electric motor cars has just been patented by A. K. Bonta, electrical engineer of the North Hudson Railway Company, of Hoboken, N. J. The invention is an electric emergency braking system which is applicable to any type of electric cars. The device is simple in construction and in principle, and as an emergency brake it possesses practical advantages which will render its adoption desirable and, perhaps, even necessary in many cities where steep grades and crowded streets make reliable braking appliance indispensable.

The North Hudson County Railway Company operates about 60 miles of road, and on two of its lines, extending from Hoboken to Jersey City Heights, there are steep grades and curves of short radius. Recent disastrous accidents on other roads have disclosed the results of cars becoming uncontrollable on steep grades, because of a failure in the brakes. In consequence the company determined to equip its cars with some absolutely reliable form of safety device. It was at first decided to provide the cars with duplicate brakes, but it was found that in addition to being expensive this plan would involve an increase in the weight and would complicate the machinery. As the duplicate brake would be seldom used there was a possibility that it might be out of order when most needed. This plan, therefore, was abandoned.

As a result of studying the situation, Mr. Bonta decided to equip a car with an electric emergency brake of his own invention. This device has been subjected to the most severe tests during the past three months and has proved so thoroughly reliable under all circumstances that the company has provided with the brake all but 15 of its motor cars, and these latter will be equipped as soon as possible.

The invention is a means of utilizing the energy of the moving car as a force to prevent the turning of the armatures in the direction necessary for the forward movement of the car. The brake is operated by the reversing switch handle and is entirely independent of the chain-brake handle. It is not necessary to throw out the overhead switch to operate the device. A quarter turn of the lever is all that is required to apply the brake. The brake-lever and the controller handle are interlocking, so that it is impossible to put on the current while the brake is on.

It found that when the brake is subjected to the severest tests, and the quickest stops are made, the current rises and falls so rapidly that there is no heating or injurious effects to the armature. The current flowing through the motors is not so great nor the voltage so high as when they are reversed to the first stop. The strain on the gears is not so great as would be supposed, as the force applied rises gradually from zero to its full power. The appliance is very simple, and there is nothing to get out of order excepting the controller fingers and the contacts. As the latter are used only in case of emergency they will last indefinitely.

The system is entirely independent of the trolley current, and will work on a curve or grade, and even when the car is off the tracks. So long as the wheels continue to revolve the brake will be applied. The construction is such that it is practically impossible for the brake to get out of order, and the control of the car is so complete that it can be stopped on a grade, going at full speed, within less than the car's length. A practical illustration of the merits of the device took place on Clinton Avenue, Hoboken, last Sunday afternoon.

A car was speeding down Clinton avenue at about eight miles an hour, when a child in attempting to cross in front, fell on the track less than eight feet distant. There was no time to apply the ordinary brake or reverse the motors and had the car not been equipped with the emergency brake no doubt another victim would have been added to the list of fatal accidents. The motorman applied the emergency brake and the car was stopped within a space of seven feet.

Since the equipment of the road with the brake seven serious accidents have been prevented and the company estimates that it has saved in damage suits several time the cost of the entire equipment. An order was recently received from the Suburban Traction Company for fifteen equipments and two cars are now being equipped for the Brooklyn City Railway Company.

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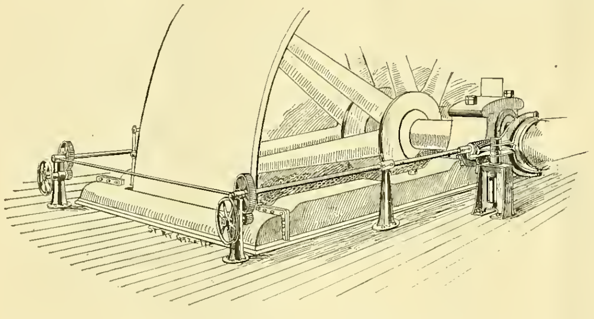
CLUTCH SHIFTING DEVICE.

The accompanying illustration shows a new clutch shifting device lately installed in the Palisade Avenue power station of the North Hudson County Railway of Hoboken, N. J. The plant consists of two Watts-Campbell Corliss engines of 500 H. P. each connected to one shaft, on which is mounted a fly wheel 20 feet in diameter with 72 inches face. The fly wheel is connected to two General Electric multipolar generators by means of 72-inch belt supplied by Chas. A. Schieren & Co. A friction clutch is mounted on the shaft on each side of the fly-wheel, so that the generators may be operated by either engine.



CLUTCH SHIFTING DEVICE.

Considerable difficulty was experienced in operating the clutches with the original shifting mechanism, and to overcome the trouble, Mr. A. K. Bonta, the electrical engineer of the company, designed the apparatus shown in the illustration. The hand wheels by which the original shifting devices were operated were removed, and the shafts on which the worm gears are mounted were extended to the rear of the fly wheels, and held by standards bolted to the floor. Secured to the shaft are gears which mesh into pinions secured to a shaft which passes through the standard. The device is operated by means of a hand wheel secured to the outer end of this shaft. The device has given good satisfaction, and since its installation no difficulty has been experience in operating the clutches.

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PACKAGE DELIVERY SYSTEM IN LEAVENWORTH.

The Leavenworth Electric Railway Company has organized a special delivery package system. A car has been made especially for the business. The car will be attached to an electric car and will make two trips a day. Merchants will be provided with signal flags by the company and whenever they have packages for delivery to these suburban points they will have only to display their flags. A man will make the rounds with a push cart and collect such packages, receipting for the same. The push cart will be run on to the package car and at certain points it is to be run off and used in the distribution of its load.

For each package weighing 10 pounds or less the charge will be 10 cents. No package weighing more than 20 pounds is to be handled by the road. The maximum charge will be 15 cents.

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ELECTRIC RAILWAY UP THE JUNGFRAU.

About fifty years since, when France, England and America were already covered with a network of railways, George Stevenson was invited to go to Switzerland and give the benefit of his experience in the matter of the construction of railways in a country so much cut up by mountains and rivers. Several companies then set about constructing lines of railways in places which lent themselves the more easily to such enterprise, but it was never contemplated then that a day would come when even the most insurmountable obstacles would be conquered, when the highest points would be, as it were, stormed and carried, and the deepest chasms bridged. Since then many climbing railways have been constructed in the mountains of Switzerland—funicular railways and others of the rack-rail type. The railway up the Righi, with its interlocking wheels, sufficiently demonstrated the superiority of the latter system, whether regarded from a practical point of view or in the light of such a purely personal point of view as safety, but disadvantages have always been found in the smoke and dirt, and the weight of the coal and water which the engines were compelled to carry. Electric lines have proved satisfactory substitutes, the power being generated by steam or by waterfalls. One of the first electric mountain railways was that constructed on Mount Saleve, in Geneva. It is this railway which serves as a model for the bold project shown in the engravings.

The concession for constructing this electric road, starting from Scheidegg, and traversing the interior of the heights of the Eiger, Monch and Jungfrau, at the summit of which it emerges into daylight by means of an elevator, was granted by the Swiss government, after long debate, at the end of last year. The railway is more than eight miles long and rises to a height of 6,890 feet, the gradient varying from 1 to 26 per cent.

Fig. 1 gives a view of the road near the summit of the Jungfrau. The line is operated by an overhead trolley system, and on the grade a rack-rail is laid in the center of the track. As may be seen in the illustration, a path for pedestrians is provided at the side of the railway.

The elevator in the center of the cone, shown in Fig. 2 of the Jungfrau has to rise 216 feet. With the exception of the station at the point of departure all the other stations, to the number of six, are bored in the solid rock, one of which is shown just above the tunnel entrance in Fig. 1. The exits communicate with pathways, by means of which travelers alighting can finish the ascent of the peaks on foot. These stations are complete with every luxury possible, containing dining-rooms and miniature bed-rooms like cabins on steamers. The elevator to the summit of the Jungfrau consists of an enormous tube fitted into the vertical hole sunk in the rock. Within this iron tube the cage ascends and descends, worked by an electric motor, which derives its power from the power-station, utilizing the waters of Lake Luchinen in the Lauterbrunnen. Within the tube is a winding staircase, so that travelers not caring to use the elevator may reach the summit of the mountain on foot. The tunnels, galleries, restaurants and elevators are all lighted with electric light, and it is even anticipated that the carriage may be heated by the same means. It is scarcely necessary to say that the stations are all in communication by telegraph and telephone with the world below. The illustrations are from drawings by G. Wassermann, engineer, of Bale, and recently appeared in the London *Graphic*.

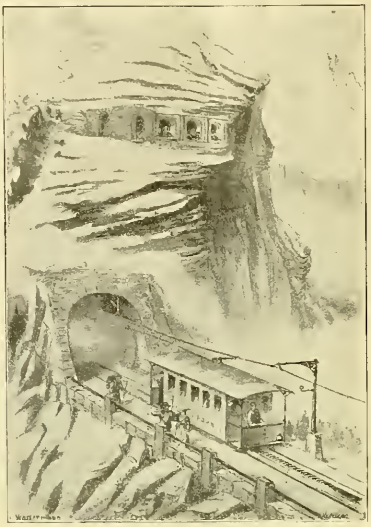

Fig. 1.—Proposed Railway near the Summit of the Jengfrau.

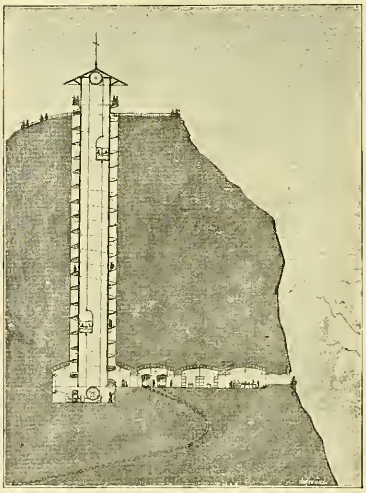

Fig. 2.—Sectional View of Elevator in Interior of Jungfrau Cone.

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Milwaukee, Wis.—The Milwaukee & Wauwatosa Motor Company will build a line from its Thirty-sixth street terminus to Waukesha and has planned to have the work finished by Sept. 1. The Waukesha terminals and franchises have been secured. The line will be equipped with electricity.

CALIFORNIA AVENUE POWER STATION, CHICAGO.

The territory to be supplied from the new California avenue power station of the Chicago Electric Transit Company includes a considerable part of the north and northwest section of Chicago. At the present time the territory is confined to a semi-circular area of about six miles radius. The cars to be operated eventually from this station will include those on Division street, Ashland avenue, Southport avenue, Lincoln avenue, Garfield and Center streets, North avenue, Fullerton and Webster avenues and one section of Western avenue, Elston avenue and Milwaukee avenue. The power supplied is mostly rented by the Chicago Electric Transit Company to the North and West Chicago street railroad companies. S. Potis, Jr., chief engineer of the latter company, has had charge of the designing and construction of the power house.

When the power plant is extended to the size for which allowance has been made it will contain twenty boilers of 300 H. P. each and eight engines with dynamos directly coupled of 1,000 H. P. maximum capacity each, making a plant capable of furnishing about 7,000 electrical horse power.

The power station which is located on California Avenue near Roscoe Boulevard is built of red brick and stone and its dimensions are 245 × 124¼ feet. The building is so arranged as to be capable of enlargement to double its present capacity. The stack is 200 feet in height and the flue inside is 14 feet in diameter. Over a million bricks were used in its construction.

The interior of the building is divided by a fire wall lengthwise into two rooms. The north room, 245 × 62 feet, holds the boilers. They are of the Campbell & Zell water-tube type of 300 H. P. each and are 10 in number. Crude oil is used for fuel. It is brought to the power-house by tank wagons and is stored in four underground tanks of 1,000 barrels capacity. In case it should be determined to use coal instead of oil for fuel the boiler-room is so arranged that coal and ash handling machinery can be installed. The coal lift will be in the shape of an endless chain, carrying the coal up to its bin above the boilers and returning under the boiler-room floor. The ash handling machine will be entirely in the basement. Murphy self-stoking smokeless furnaces are provided for the boilers in case this change should ever be made.

Feed and condensing water is taken from the Chicago river. From a small crib on the west bank it passes through two Jewell filters of 25,000 gallons an hour capacity. The pumps deliver the purified river water into a large reservoir, from which it is taken to the water heaters, condensers and boilers. The pumps are of the Blake pattern. The plant is provided with two Berryman feed water heaters of 200 H. P. each, and four of 1,000 H. P. each, located in the boiler room. The oil and water piping is located under the boiler room floor in the basement. Everything throughout is easily accessible, and is strictly fireproof. The floor of the boiler room is made of iron beams with brick arches. The engine-room floor is built of rolled steel plates, supported on iron columns.

The engine room contains four Fraser & Chalmers cross compound Corliss engines coupled directly to Siemens & Halske dynamos. The engines are horizontal and condensing, and are rated at 1,000 H. P. maximum capacity. Jet condensers are used, a condenser and feed water heater being located in the basement just below each engine. The piping to the engines is taken below the floor, giving the engine-room a neat appearance. A feature of the machinery is the automatic oiling system, by which oil is distributed from a central reservoir to all the bearings and the waste passed through a filter ready for use again.

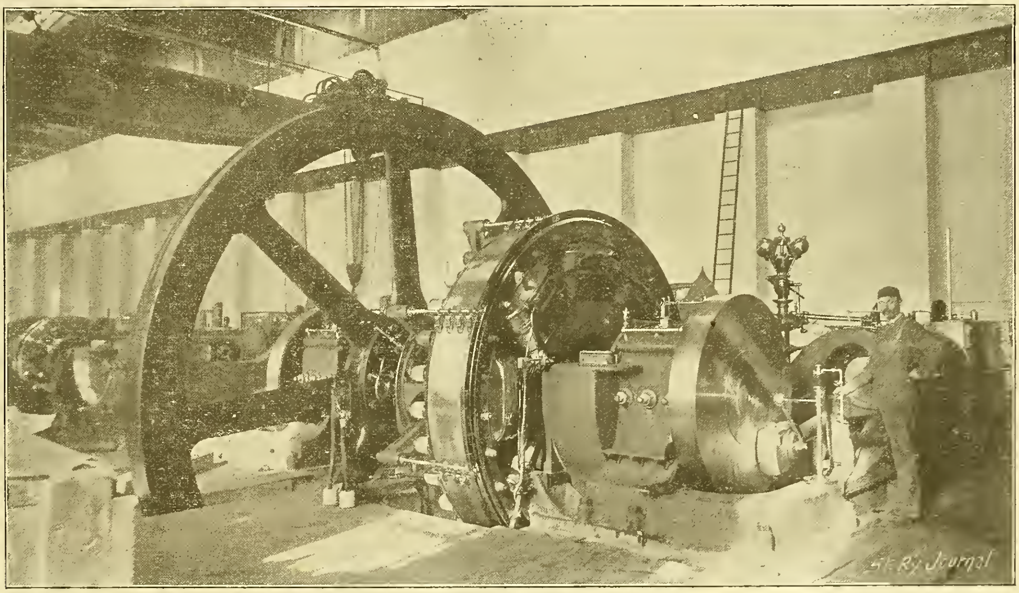
The Siemens & Halske generators are coupled directly to the engine shafts, one for each engine.* They are of the street railroad type, compound wound for 525 volts. The eight field magnets are on the inside of the armature. The armature is of the Gramme type, made of copper bars, the outside edges of which are used as the commutator. The wiring of the dynamos is done from below, the cables which connect them with the switchboard being carried under the engine-room floor on porcelain insulators. The engine-room is spanned in the direction of its width by a Walker hand-power crane of 20 tons capacity, greatly facilitating the handling of machinery and speed of making repairs.

The switchboard is in two tiers. The upper or feeder board is located in a gallery 160 feet long on the south side of the engine-room. It contains 40 feeder panels, each one carrying an automatic circuit-breaker, an ammeter and a switch. The lower board, on a level with the floor of the engine-room, is used for handling and the regulation of the dynamos. It contains eight panels, four of which are occupied. Each panel is of a size to contain instruments for a thousand horse-power dynamo. The entire switchboard is built of marbleized slate, supported by an iron frame. The instruments are of Weston and General Electric makes.

As the plant supplies current for a number of electric lines on the east side of the river, some means had to be devised to get the feeders across. For this purpose a tunnel was built below the bed of the stream. From the power-house a shaft 40 feet deep runs down to the tunnel. The tunnel itself is 200 feet long, with another 40 feet of shaft rising on the east side of the river. At the opening of the east shaft a tower is built which carries the wires up to the level of the poles that carry them the rest of the way.

All the feeders which do not cross the river run out of the power-house overhead. They are let through the walls in large porcelain insulators and are carried in all directions on poles. The wires which go across the river run from the switchboard directly down into the basement and thence to the tunnel. From the switchboard to the tower across the river they are supported on iron racks with porcelain insulators. Stranded cables are used throughout.

The return of the current from the tracks is provided for in every case by cables and the ground is not relied on. One ground plate is connected to the switchboard, but it is only accessory, the main dependence being on the metallic return. The amount of wire in feeders and returns which runs out of the power-house amounts to a cross-section of nearly 17,000,000 circular mils.



CALIFORNIA AVENUE POWER STATION, CHICAGO.

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Vermont Electric Railway Projects.—Vermont was somewhat tardy in the adoption of electric propulsion for street railways, but it promises to rapidly make up for its loss of time in this direction. The success which has attended the operation of electric lines in Burlington and Rutland has led capitalists to seek opportunities for investment in electric railroads in other towns in the State, and it is safe to say that the lapse of a comparatively few years will mark the construction of a dozen lines in various parts of Vermont. The unsurpassed water power facilities of which the State boasts makes it possible to operate electric roads at small expense as compared with some of the big electric systems of the country; for when the plant is once secured and put in operation, wages, wear and tear of cars and supplies constitute the chief bills of expense.—*Bennington (Vt.) Banner.*

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* For the accompanying cut we are indebted to the *Street Railway Journal.*

THE ELECTRIC RAILWAY FOR INTERURBAN TRAFFIC.*

BY BALPH W. POPE.

The tone of ridicule with which the claims in favor of the electric motor for traction purposes, was first greeted, has not entirely disappeared. Gradually, however, the inexorable law of economics is preparing the way for its more extended use in unoccupied fields, or those which have heretofore been occupied by the direct application of steam or animal powers. The complete story of the commercial development of the United States is interwoven with the growth of transportation facilities. Canals and turnpikes were the first public works to which the founders of the republic directed their attention. Probably the most important achievement in this direction was the construction by the State of New York of the Erie Canal, which has been, and still is, a controlling factor in the fixing of transportation rates between the Western and Eastern States. Where neither natural nor artificial waterways existed, railways were finally projected, but with the expectation of operating them by animal power. The railroad preceded the steam locomotive, so that while to-day the adaptability of electricity as a substitute for steam may be doubted, few will dispute its superiority to the horse or mule. The steam locomotive came, however, and a wonderfully efficient machine it was, even in its crudest form. With the general appreciation of the advantages of improved methods of transportation, it is not strange that a genuine railroad boom was soon in an advanced stage of development. At that time, and since, there has been no more popular opening for the investment of surplus capital, than in schemes of transportation and communication. The steam locomotive of the '40's, however, was as much of a bugaboo as the "deadly trolley" is to-day. Whatever might have been the plans of its promoters regarding the utilization of the highways for the iron track, no such innovation was generally permitted, and it was really little hardship that the companies were compelled to purchase their rights of way. Probably these enforced purchases of real estate, were the best investments that were made, and the privileges thus acquired, notably in the case of the New York and Harlem Railroad, are perhaps the most substantial part of their assets to-day. Notwithstanding the dangers of the electric railway, popularly grouped under the general title of the "deadly trolley," experience has shown it to be a reasonably desirable accompaniment to an ordinary wagon track along a country highway, and although an intruder upon the sovereign rights and privileges of the city truckman, the motor car has its friends and supporters among its patrons, whose lives have become more pleasant and satisfactory with its more general adoption.

The re-equipment of existing street railways has been a gigantic task, while the building of new lines has been a tempting field for the capitalist, since the construction of new steam railroads has practically come to a standstill.

Gradually the policy of connecting adjacent towns and cities has almost forced itself upon street railway companies, until finally the existence of an important rival to the steam railroad has been reluctantly admitted, and various plans have been either suggested or adopted in order to prevent serious inroads upon the lucrative revenue derived from local traffic.

A curious feature in steam railway management, which has been handed down from early days, is the indifference shown toward the accommodation of local traffic, and the comparatively high rates exacted for it. There are various reasons for the advantages offered by the trolley car for this work. First in importance, perhaps, is its accessibility. Even under previous conditions it has been frequently the case that the patron of the steam road must utilize the street car between his house or office and the station. If at the end of his trip he must go through a similar experience, he changes cars at least twice, and incurs an expense, which would entirely cover the ordinary car fare by the trolley system. Frequently, however, complete trips of this character may be made for a nickel, and the maximum fare may be placed at 10 cents, the exceptions being very few. The comparatively short interval between cars, is another important advantage on street railways. In fact, one of the most serious drawbacks to the otherwise convenient attributes of an unimportant line is that the cars may be 15, 20 or even 30 minutes apart. Whatever the interval may be, however, it is adhered to with some degree of regularity.

In the case of steam railroads there appears to be little attempt to arrange train intervals with any degree of regularity even in a suburban service. This is of minor importance, in the morning, and early evening hours, where the immense traffic may call for trains averaging 15 minutes apart. I say "averaging" advisedly, for little attempt is made to start trains at regular time and intervals which will readily fix themselves in the mind. This is especially annoying in the evening, where upon one road with which the writer is familiar, trains leave New York at 7:30, 8:00, 8:30, 9:15, 10:15, 10:45 and 11:30 P. M. When one becomes thoroughly drilled in these hours, a change of a few minutes will be made in one or more of them, and the occasional passenger, who has spent a year in familiarizing himself with the schedule, becomes again the slave of a time-table, which one must always have within reach. Many street railways, however, might with profit, take a leaf from the steam railroad management, and provide pocket schedules for their passengers, which, if properly arranged, would be a great convenience, and possibly lessen the number of inquiries, which experience has taught, are not always answered correctly by the conductor. Of course it will be argued that trains must be run at such times as will enable the company to utilize its machinery and staff to the best advantage, or in order to make some important connection. This, however, is simply additional proof that local traffic is not catered to, and it is for these combined reasons that the trolley continues to gain in popularity. There are reasons for believing, however, that many railroad managers do not object to the competition of the trolley lines, as they make no attempts to meet their innovations, beyond obstructive legislation, or petty warfare at grade crossings. When the electric line between Minneapolis and St. Paul encroached upon the established railroad business to such an extent that one local train after another was abolished; the entire traffic was confined to through trains, no concession whatever being made in the existing rate of 25 cents between the two cities, which all experience goes to prove might at least have been reduced to 20 cents, for this distance of about nine miles. All this time the thick and thin advocates of steam locomotion were striving to prove that electric transportation was the more costly of the two.

A similar state of affairs exists in the East, where a rate of 12 or 13 cents for an excursion ticket prevails for distances of only two or three miles, while a single ticket for the same trip will cost still more. In territory of this character many trolley lines are projected, and it would appear that is their competition was really feared, the adoption of a uniform fare of a nickel within a certain radius might result in permanently securing business which will soon slip from the grasp of the companies that have retained it for so many years. Whatever this loss may be, however, the general extension of trolley lines, embracing large towns and cities and thickly populated country districts, acting as feeders, will bring to connecting steam railroads more business than they divert. In fact, one of the serious problems which has always confronted the managers of great trunk lines, has been the establishment of branches, which while bringing in new business, would not at the same time entail a loss. It appears quite possible that this service will gradually be developed by the electric railway in a perfectly natural and rational manner. Comparatively little progress has been made in conveying freight over electric lines, but this is a branch of the business that will come in good time. Eventually it is quite likely that a large proportion of the hauling now done by horses in New York and vicinity will be handled by electricity. There is a network of cities and towns in central New Jersey, between which there is no satisfactory means of communication, as all roads lead to New York City. It is frequently more convenient for passengers, to say nothing of freight, to go across the Hudson River, and back again by another line, than to attempt a more direct geographical route within the State. It will be argued that if there had been a demand for such traffic it would have been accommodated, as is the case between Newark and Elizabeth, or Paterson. This is quite true, but the construction, maintenance and operation of a steam railroad has been too formidable an obstacle. Under present conditions it appears quite possible that there will soon be a change, and direct communication between many such points will be a fact rather than a dream.

Although superior in point of speed to its predecessor, the horse car, the trolley car does not yet rival the steam locomotive in practice, neither can we expect it to do so in the class of service referred to. What it suffers in comparison as to speed, however, for runs of 12 or 15 miles, it gains in frequency of service or convenience to its patrons. Add to this the advantages in fare, the thoroughly heated and lighted cars and in summer the freedom from dust, gas and cinders, and it will be readily seen that the trolley car has an excuse for its existence.

The writer does not wish to be understood, however, as limiting the electrical railway to a service of this character. The electric service between New York and Philadelphia, suggested and outlined by Mr. Frank J. Sprague before the Electric Light Convention at Kansas City, 1890, certainly appears feasible in the light of progress in other directions since that date. It does not require a great stretch of the imagination to outline in one's mind such a service between New York and Philadelphia, with cars at 15 minute intervals, making the run in one hour. A "nickel in the slot" might not pay the fare, but a silver dollar ought to do it, if the metal is not rated too low at that time. Excepting, however, for a service of this character between two important cities, for surface, elevated or underground city railways, for seaside excursion trips and for other special uses, the electric motor need not arouse the jealousy of its well developed and thoroughly perfected colleague, the steam locomotive.

Before dismissing the subject, it may be well to state briefly why electricity is better fitted for certain transportation duties than is steam.

In the first place, its power is developed at one or more central points, and picked up where utilized by the traveling motor. The motor is not a complex organization, requiring the constant attention of two skilled men. It need not necessarily be an obnoxious part of the car to which it is attached. Imagine an ordinary passenger coach with a motorman standing on its front platform. His duties on a through run from New York to Philadelphia would be confined to starting, regulating speed and stopping. Should his car break down it is not necessary that he should be able to repair his motor. At the worst the following car could push it in. Instead of a train made up of a baggage car, smoker, parlor cars and day coaches, cars of these various descriptions could leave at different hours. A parlor car on the even hour, smoker and baggage car in 15 minutes, day coaches on the half hour and so on. Additional cars might be run either as trailors, or at more frequent intervals. This is simply a suggestion of the possibilities of an electric service, which would be possible to-day, operated at the rate of at least 30 miles per hour. There appears to be no authentic record of the speed actually attained by motor cars now in use, as their rate is necessarily limited by the location of the track, city ordinances or the rules of the company. On such electric roads as that on the Canadian side of Niagara Falls, or a certain portion of the line between Newark and Jersey City, there would appear to be no reason why the speed of a motor should be limited in practice excepting that the ordinary trolley connection may not be sufficiently reliable.

Through the daily press, as well as electrical journals, the reader is constantly reminded of the continual growth in electric railways by the projection of new lines in various parts of the country. The aggregate of this increase is not as large as it would have been but for the financial depression of the last two years.

Fortunately, however, the electric railway offers as good or perhaps better inducements for the investment of capital at this time, and under reasonable financial management well located lines should bring prompt cash return.

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[*] From *Electric Power*.

SETTLEMENT OF STRIKE ON THE ANACOSTIA ROAD, WASHINGTON.

The recent strike of the employees of the Anacostia Railroad Company of Washington was settled in an unusual way. The men struck for increased pay which the company asserted it could not concede, as the income did not warrant any additional expense. The settlement was finally effected by a proposition that the wages of the men should be increased if it should prove that the income increased during the month of April. The agreement which was decided upon was as follows:

> Memorandum of agreement between the Anacostia Railroad Company and all its employees, exclusive of appointed officers. The company agrees to continue the present scale of wages, and if the traffic receipts for the month of April, 1895, are in excess of April, 1894, to divide such excess among its said employees *pro rata* in proportion to the amount received by each employee during the month. All employees under date April 2 who comply with the rules to go to work. We are willing to have Mr. Gwynn, secretary of the Street Railway Protective Association of the District of Columbia, obtain information by inspection of our daily receipts.

METROPOLITAN ELEVATED, CHICAGO.

The formal opening of the Metropolitan West Side Elevated Railroad took place last Wednesday. The line will not be opened for public travel until some time next month.

NEW YORK & PHILADELPHIA TRACTION COMPANY.

If the plans of the New York & Philadelphia Traction Company are carried into effect, it will eventually construct several hundred miles of electric railway. The company proposes to span the State of New Jersey and build many subordinate lines. The terminal cities are those mentioned in the corporate name. If the line as now planned is constructed, it will furnish transportation for considerable territory that is meagerly supplied in that respect at the present time. It is estimated that if the road is built as proposed, an outlay of $10,000,000 will be required.

The plan for the system originated with Joseph H. Reall, of Bloomfield, N. J. He selected Paterson as his starting point in the north, and spent several months with his engineers picking out a line to Trenton and Philadelphia that would strike the centres of the largest population and encounter the least grades. A route was made out and adopted, with the exception of a few minor changes.

Beginning at Paterson, the line passes through Upper Montclair and Montclair, and skirts the west boundary of East Orange and the east boundary of West Orange and the west boundaries of Orange and the village of South Orange. Proceed southward, it passes through the Maplewood, Milturn and Springfield to Westfield, on the New Jersey Central Railroad. Here a line was deflected to Rahway, Woodbridge and Perth Amboy and Elizabeth, and another to the latter place, through Cranford, Roselle and Loraine. This line continues southward from Westfield in the direction of Philadelphia, and passes through Fanwood, Netherwood, Plainfield and Dunellen to Bound Brook, from which place a branch extends west to Finderne, Somerville and Raritan, and east through South Bound Brook to New Brunswick.

From Bound Brook southward in the direction of Philadelphia the main line is laid out through Millstone, Rocky Hill, Kingston, Princeton and Lawrenceville to Trenton, where it crosses the Delaware River into Pennsylvania and passes through Morrisville, Bristol, Torresdale, Tacony and Holmesburg to Frankford, in the outskirts of Philadelphia. Another branch starting at Trenton follows the Jersey shore, Bordentown, Burlington, Beverly and other river points to Camden.

The following is the estimated cost of the entire system of the New York & Philadelphia Traction Company, by division, the calculations based on on actual experience in electrical railroad building:

Branch.	Miles.	Cost.
Paterson City and Passaic	32	$1,500,000
Paterson to South Orange, including city of Orange and Bloomfield	30	600,000
South Orange to Westfield	11	275,000
Westfield, Rahway, Elizabeth to Springfield	10	300,000
Elizabeth to Bound Brook, including city of Plainfield	25	650,000
Raritan to New Brunswick, including New Brunswick	19	600,000
Bound Brook to Kingston	16	400,000
Kingston to Trenton	11	350,000
City of Trenton	32	1,200,000
Trenton to Burlington	16	400,000
Burlington to Camden	18	450,000
City of Camden	32	1,200,000
Trenton to Frankford	20	500,000
Plainfield to Metuchen and New Brunswick	10	250,000
New Brunswick to South Amboy	16	400,000
Total	301	$9,575,000

The company next began the tedious work of obtaining the necessary right of way. This was undertaken and prosecuted so energetically that the right has been obtained over the entire route. This part of the work employed a half dozen to a dozen men most of the time for 18 months. Consents were obtained from property owners for 1,000,000 feet, or over 200 miles of main line and branches. A construction company was then organized to finance the enterprise and build the road. The concern was named the Central Jersey Traction Company, with a capital stock of $1,000,000. Mr. Reall organized another company under the traction act of 1893 to operate the road when built under the name of the New York & Philadelphia Traction Company, with $10,000,000 capital stock to enable the issue of $10,000,000 of bonds to pay for the cost of the road as constructed. Mr. Reall was made president of both companies and still holds the position.

The road is calculated to connect practically with every steam road in the State and with almost every electric road between the Hudson River and Cape May. It forms a connection between the Metropolitan Traction Company of New York, the Consolidated Traction Company of Newark and Jersey City, and the Philadelphia Traction Company of Philadelphia, all three of which are practically controlled by the same interests and represented by John D. Crimmins, of New York; B. M. Shanley, of Newark, and Messrs. Widener and Elkins, of Philadelphia.

VALUE OF THE BOSTON SUBWAY.

It is announced that the West End Street Railway Company, of Boston, has practically agreed to lease the subway to be constructed in that city to relieve the congestion of traffic in the business center. A lease to the street railway company would effectually disprove the great objection to the improvement, *i. e.*, that the cost was so great that the project was impracticable. The proposition of the West End provides for the payment of the interest on the bonds, and also carries with it the responsibility of creating a sinking fund that shall wipe out the indebtedness when the securities mature at the end of 40 years.

Chairman Crocker, of the subway commission, recently made this statement of the prospective value of the improvement:

"It is asked, what are the grounds upon which the commission bases its confidence that the subway when built will bring into the city an income sufficient to pay the interest on the debt and the sinking fund requirements, so that our taxes shall not be increased in consequence of its construction?

"The act requires the commission, upon the completion of the subway, to order all surface tracks to be removed from Tremont street, between Boylston street and Scollay square, and from Boylston street, between Park square and Tremont street, and authorizes it to order any other tracks which, in its opinion, have been rendered unnecessary by the construction of the subway, and which are above said subway, or within a distance of 1,000 ft. from any entrance to said subway, to be removed from the street. It further provides that surface tracks shall not be laid or maintained in that part of any street from which said commission may have ordered such tracks removed.

"These provisions are of the utmost importance. The West End Street Railway, after the completion of the subway, will have no means of traffic along the Tremont street route except through the subway. That company might refuse to pay an adequate rental for the use of the subway, stopping its cars at the end thereof. What would be the result? The locations of the West End Street Railway are revocable by the Board of Aldermen, subject to the approval of the Board of Railroad Commissioners. If the company should take that indefensible position, its locations on the routes connecting with the subway would be revoked and would be granted to some other company.

"The West End will not take that position.

"What are the elements which go to show that the West End company or any other street railway company can afford to pay an adequate rental for this subway.

"They are the following:

"The care of tracks in the subway will be less expensive than on the surface. They will not be worn by street traffic. There will be no expense in keeping them free from snow in winter.

"The power consumed in running a car in the subway will be less than in running a car upon the surface.

. . . .

"The company will be relieved of the expense of maintaining its present system of overhead wires.

"Liability to accident from falling wires, from collisions and crossing accidents will be practically eliminated.

"The most important consideration of all, however, is that the subway will open possibilities for increasing several fold the traffic of the company. The company has to-day reached the limit of its traffic capacity. The company must in some way provide for the natural increase in traffic, and only the subway will render that provision possible.

THE FIGHT BETWEEN TWO CHICAGO COMPANIES.

The sequel of the attempt of the Chicago General Street Railway Company to run its cars on the tracks of the Chicago City Railway Company without the latter's consent appeared last Saturday, when the former began an injunction. It will be remembered that the Chicago General Company, in its desire to obtain a down-town outlet for its cars, hit upon the theory that the city could grant to a company the right to run its cars upon a street regardless of the fact that another company in the enjoyment of a franchise had already laid tracks on the street. To test the correctness of this theory the Chicago General Street Railway Company attempted to run one of its cars on the tracks of the Chicago City Company. The officers of the latter prevented the entrance of the car upon its tracks, and the effort was abandoned. The suit against the Chicago City Railway Company was then decided upon; in fact the attempt to invade the territory of the Chicago City Railway Company was made in order to test in the courts the correctness of the theory.

The bill recites the origin of the plaintiff company and the troubles it had on account of the opposition to its construction offered by the old companies. Then it shows that the company obtained an ordinance giving it the right to run its tracks on Twenty-second street and connect with those of the Chicago City Railway Company at or near Grove street. In order to get to Grove street, which is the first street east of the river at Twenty-second street, it was necessary for the company to cross the Twenty-second street bridge. The bridge and its approaches were not strong enough to hold up street cars, and the city rebuilt them at the expense of the Chicago General Company. The right to run on the east approach to the bridge was claimed by the Chicago City Railway Company, whose franchise gave it the right to the river. It was therefore agreed between the two companies, it is alleged, to use the tracks jointly between the river and Grove street. In accordance with this understanding, the Chicago General Company had the approach built which extends from Grove street to the river and the South Side Company laid the tracks. Now it is said the approach cost $1,200 and the tracks $1,000. The Chicago City Company claims to hold exclusive right to and title in the tracks.

This suit is therefore peculiar in presenting to the court the allegation that the complainant paid for the street and the defendant paid for the tracks laid on it. If the defendant owns the tracks the complainants on their allegations would set up the plea that they owned the street in which the tracks are laid. The Chicago General company claims it has a perfect right to run its cars east as far as Grove street. It alleges that the Chicago City Company is powerful and physically able to prevent it from running cars unless the court interferes. It therefore asks that a temporary order and writ of injunction be issued immediately prohibiting interference in the operation of its cars over the tracks in question, and to grant a permanent injunction on the hearing of the suit.

Lock Haven Traction Co.—The Lock Haven Traction Co., which has leased the electric railway of Lock Haven for 999 years, proposes to make several important extensions. The capital stock of $100,000 of the old company has been increased to $300,000 which is all subscribed for, and the mortgaged indebtedness was placed at $150,000, the West End Trust Company, of Philadelphia, becoming the trustee. The lease went into effect April 1st. The traction company organized by electing the following officers: President, C. A. Bragg, of Philadelphia; vice-president, Mayor W. H. Mayer, of Lock Haven; secretary, A. J. Martin, New York; treasurer, John A. Seely, of New York; directors, A. Markle, of Hazelton; Frank Given, of Columbia; R. H. Irvine, of Lock Haven; M. J. Mitchell and George Breed, of Philadelphia; solicitors, Jesse Merrill, of Lock Haven, and W. B. Given, of Columbia.

COMMENTS AND VIEWS OF CONTEMPORARIES.

ELECTRIC AND STEAM RAILWAYS.—In the rivalry between the electric and the steam railroads in Connecticut, the Legislature of the State ought to refrain from interference. If the electric lines are injuring the business of the steam lines, it must be because they enjoy economic advantages not possessed by the other. The cheaper and more serviceab'e of the two powers will surely win in the end, whatever be the legislation enacted in regard to it.—*New York Sun.*

BOSTON SUBWAY.—The truth is the construction of the subway will give a relief to the street-car travel that is now congested in Tremont and Boylston streets, and will, moreover, afford transit through the center of the city at a speed similar to that at which the electric cars now move at the south end on Tremont and Washington streets. Such an increase in speed will be a decided gain, and will justify the proposed construction, particularly as the money expended in building the subway can be collected from the street railway company which makes use of it.—*Boston Herald.*

TROLLEY MAIL SERVICE.—In the strike in this city those cars which carried the mails or which ostensibly did so, were comparatively free from injury, and now the tendency of all surface carrying companies is to seek the patronage of the government for the sake of the protection it involves. The question of the right of the federal government to send troops into any state for the purpose of reopening mail communication was ably reviewed in the annual report of the attorney general, and it is a right which is bound to be amply exercised in the future, with the sanction of even the stoutest sticklers for "state sovereignty."—*Brooklyn Eagle.*

ELECTRICITY ON STEAM ROADS.—Those who predict that electricity will, before many years, entirely supplant steam as a motive power on railroads are by no means without believers, and one of the best evidences of the coming change is the number of roads making or about to make experiments with the new agent. Among these is the Baltimore & Ohio, which, as is well known, will use electricity to move its trains through the Belt tunnel; and if the plan prove successful, of which there is little doubt, is it too much to prophesy that the next step will be the use of the same motive power on the line between Washington and Baltimore, and later upon all the lines? The whole railroad world will watch the experiment with the Belt tunnel with the greatest interest.—*Baltimore News.*

STEAM AND ELECTRIC RAILWAYS.—The Consolidated road asks the legislature to prohibit the construction of electric roads between towns now connected by steam lines. It seems to us that this is an extreme demand. Cheaper and more convenient transportation is not a public curse, but a public benefit; and in so far as the electric road is able to supply such transportation its construction is to be welcomed, not prohibited. The vested interests in the steam roads have their rights, but not the right to stand against improvement and progress. The cotton mill equipped with old machinery might as well ask the legislature to prohibit the construction of a new competing mill with improved machinery on the ground of injury to a vested interest, as for the steam roads to demand the prohibition of electric road construction along their lines.—*Springfield Republican.*

OPPOSITION TO THE TROLLEY MAIL SYSTEM.—So the Boston trolley men object to having the Brooklyn trolley mail system introduced in that city. The reason is that they will want to strike after a while and they do not want any soldiers around to protect the United States mails. From the motorman's standpoint this is probably a valid objection. The motorman has been laboriously coddled into the idea that there is no labor in this country to be protected by law and asserted by walking delegates except unintellectual and unskilled labor. Trained labor, labor that has been to school, labor that puts money into the bank to guard against the future, labor that keeps its mouth shut and works, labor that thinks at its work as well as acts, is not going about the country demanding that the mails shall be distributed from a wagon, because if carried in a car the men who run the car would be debarred from the precious advantage of smashing its windows when officers of the road neglected to obey the orders of their men.—*Brooklyn Eagle.*

ELECTRIC AND STEAM ROADS.—The struggle between the electric or trolley railroads and the steam railroads in Connecticut has become very sharp in the State Legislature. The steam people are fearful of the competition of the electric people, fearful that the latter will take the greater portion both of the passenger and the freight traffic; and hence they oppose the granting of charters to them. The electric lines can carry both passengers and goods more cheaply than the steam lines, and they have greater facilities for stoppage at places along their route. If it be so, we do not see how the steam people can hold out against their electric competitors for any great length of time. We do not believe that any legislature can interfere very long with the operation of economic laws or forces. It may be hard upon the steam railroads to lose business; but it is important to the community that transportation shall be as cheap as possible. The steam people have no right to complain even if they should be driven out.—*New York Sun.*

ELECTRIC ROADS IN THE SOUTH.—In the hilly regions near Asheville electric cars run in every direction, even up the sides of spurs of the Blue Mountains, to the great convenience of the inhabitants, who are now able to travel quickly for three, five, six or more miles, making a journey in a few minutes which would formerly have taken an hour's time. Where the best of teams moved laboriously through the clinging sand, the trolley car runs along at ten, twelve or fifteen miles an hour, up hill or down. The development of the region and the comfort of travel have been so largely promoted by the introduction of electric traction that new plans for its extension meet with general favor; and there is a project for the building of a trolley freight line through the tobacco-growing region of western North Carolina, where agricultural products are carted to market at heavy expense. It seems to us that electric railroads are bound to supersede the older agencies of transportation in very many parts of the United States, both in the country and in the city.—*New York Sun.*

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FINANCIAL NOTES.

Chicago City Railway Earnings.—The earnings of the Chicago City Railways, according to advices are growing at the rate of $1,250 per day in the last week.

Purchase of a Carthage, Mo., Road.—The Jasper County Electric Railroad Company has bought the Carthage horsecar line. Cars were stopped running and the tracks will be torn up. Until the electric road is completed, in about two months, Carthage will be without street railway accommodations.

Consolidation in Elgin, Ill.—Arrangements have been completed for the consolidation of the Elgin City Railway Company and the Aurora City Railway Company. The new company has a capital stock of $1.200,000. Besides operating the two plants already built the new company will build an electric line from Carpentersville, four miles north of Elgin, thirty miles south along the Fox River, connecting Dundee, Elgin, St. Charles, Geneva, Batavia and Aurora. The road will be built and in operation by the end of the summer.

The Little Rock Litigation.—Judge Williams has handed down a decision in the case of the receiver of the First National Bank of Little Rock against the Capital Street Railway Company. The decision was in favor of the plaintiff. The bank sued on notes amounting to $60,000, alleged to be due from the company before it was merged into the City Electric Street Railway Company. Unless other complications arise the entire electric street company system is to be sold in accordance with a former decree of the court to satisfy the claims of the St. Louis and Atlantic (Philadelphia) Trust Companies for the holders of the first mortgage bonds, amounting to more than $600,000. These corporations will buy in the property, which is valued at over a million dollars.

Changes in Los Angeles.—The street railway system of Los Angeles, heretofore owned by the Consolidated Electric Railway Company, has been acquired by the Los Angeles Railway Company, a strong corporation recently organized and controlled by the bondholders of the former company. Mr. Thomas Brown, a prominent banker of San Francisco, is president of the new corporation. Mr. Fred. W. Wood, of Los Angeles, formerly president of the Temple Street Cable Railway Company of that city, a thoroughly equipped street railway man, is general manager. The new management propose at an early date to convert the cable and horse lines into electric lines, and a general increase will be made in the equipment to meet the steadily growing demands of its traffic. The new company is a strong one financially and will make its road first class throughout. Mr. E. P. Clark, the former general manager of these lines, has become the owner of the entire Pasadena City system as well as the inter-urban lines between Los Angeles and Santa Monica and Los Angeles and Pasadena, and will devote his attention to the building up of these properties.

General Electric Patent Account.—A great deal has been heard about the patent account of the General Electric Company. As a matter of fact the so-called patent account is the item of "patents and franchises, $8,159,264," which has been unchanged since the organization of the General Electric Company, and its value at the present time has not been so seriously impaired as the records of the patent department and law courts might lead one to believe, as the licenses and franchises from that account still pay the company about five per cent. or $400,000, on its total capitalization, and in some years about $500,000 has been received. The last annual report of the General Electric Company showed a book value of $59 per share, including this patent and franchise account, whose valuation amounted to $26 per share. Therefore, at $27 per share (lowest price March 4 at $25⅞) General Electric was sold at $6 per share less than its book valuation with the entire patent and franchise account eliminated. This book value a year ago of $59 per share was after the revaluation which wiped off the company's books $14,600,000.—*Boston News Bureau.*

Alley L. Reorganization.— The directors of the Chicago & South Side Rapid Transit Company of Chicago have formulated a reorganization scheme. In a circular just issued they have asked the stockholders to appoint David R. Lewis, George T. Smith, James A. Fullenwider, or William B. Walker their attorneys with complete power to formulate a reorganization scheme and the right to assess the stock such an amount as they see fit. Stockholders of the company have received circulars signed by the directors in which the facts concerning the default on the first mortgage bonds, April 1, are rehearsed, and in which attention is called to the fact that the committee of stockholders appointed to formulate a financial plan has utterly failed to come to any agreement among themselves as to a policy to be recommended, and has never made a report. The circular says that the road had on hand, April 1, about $25,000 available for the payment of interest. The average daily traffic in January was 39,943 passengers, in February 41,223, and for March 43,230, making the total receipts for the three months $186,785. The average daily expenses of maintaining and operating the road are given as $1,572.

In Favor of Nassau Company, Brooklyn.—Judge Van Wyck has handed down a decision in favor of the Nassau Electric Railway Co., which has been fighting to complete its road on Marcy avenue, Brooklyn, while the city has tried to prevent the company from doing so, on the ground that it had not obtained the necessary consents of property owners. In his decision Judge Van Wyck holds "that the plaintiff has been duly incorporated for such purpose; that the proper local authorities of this city have duly granted their consent to such construction, maintenance and operation of such road upon such street; that the Board of Railroad Commissioners has duly granted its order of approval of the same; that the plaintiff has duly obtained the properly-executed consents of the owners of more than one-half in value of the property bounded on that portion of Marcy avenue through which its route extends, to the construction, maintenance and operation of such road thereupon; that the defendants, after the plaintiff had entered upon the work of construction of such road upon such avenue, have interfered with the construction, and threatened to interfer with the construction, maintenance and operation of such road upon such portion of said avenue; that such interference will greatly damage plaintiff to its irreparable loss and injury."

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NEW INCORPORATIONS.

Peoria, Ill.—The Richwoods Street Railway Company has been incorporated; capital stock, $50,000; incorporators, Robert M. Cox, James M. Morse and Theodore J. Miller.

Springfield, Ill.—The Electrolytic Insulating and Conduit Company has been incorporated with a capital stock of $5,000,000. The promoters are H. Clay Wilson, Benj Knudson, Jas. E. Henderson.

The Standard Air Brake Company, of New York City, has been incorporated with $50,000 capital stock by Henry Seligman, Albert Strauss, Theodore Seligman and E. D. Phillips, all of New York City.

Denison, Tex.—The Denison Street and Electric Railway Company has been incorporated; capital stock, $50,000; promoters, A. F. Platter, G. McLegan, P. H. Tobin, T. Murphy and E. H. Lingo, of Denison, Tex.

Mahanoy, Pa.—The Muncy Valley Street Railway Company has been incorporated. The capital stock is $50,000. The following are interested in the company: Charles U. Brumm, Minersville; John J. Coyle and C. C. Smith, Mahanoy City, Pa.

Red Bank, N. J—The Atlantic Highlands, Red Bank & Long Branch Electric Railway Company has been incorporated, with a capital stock of $500,000. The promoters are David S. Arnott, William H. Hazard, Silas B. Dutcher and Samuel S. Whitehouse, of Brooklyn, N. Y.

Chicago, Ill.—The Metropolitan Electric Street Railway Company has been incorporated. The capital stock is $5,000,000. The object is to operate street railways, with necessary tracks, turnouts, etc., in the counties of Cook, Du Page, Kane, Lake and Will. The incorporators are Robert P. Parker. Richard E. Breed and James F. Dagley.

Hobart, Ind.—The Hobart Electric Railway Company has been formed to make the preliminary arrangements for the construction of an electric railway from Hobart to Chicago. A. Morrison is president and A. J. Smith secretary. Committees have been appointed to secure articles of corporation, select a route and complete arrangements. Several thousand dollars have been subscribed locally.

Middletown, N. Y.—The Middletown and Bloomsburgh Electric Railway Company has been incorporated with a capital of $200,000, to operate a street surface railroad from Middletown, Orange County, to the village of Bloomsburgh, Sullivan County, a distance of ten miles. The directors are: J. C. Hinchcliffe and John Hinchcliffe, of Paterson, N. J.; W. B. Rockwell, of Scranton, Pa., and E. G. Wightman. F. D. La Bar, C. H. Smith. A. E. McIntyre, W. B. Royce, and W. H. Wiggins, of Middletown.

Lewiston, Me.—A company has been formed to build an electric railroad from the East Auburn terminus of the Lewiston & Auburn road to Turner village, a distance of eight miles. The incorporators are: Wallace H. White, William T. Smart, A. B. Isaacson, O. S. Ham. F. W. Dana, N. Q. Pope and Henry W. True. The road will carry passengers, freight and in all probability the mails. Turner village has a woollen mill, and its raw material and product are transported to and from Auburn by teams. The freight beside this will include lime, hay, farm products, cream for butter factories, lime casks, kiln wood, bricks and curbing and building granite. There are 11 water powers on the line. Lumber, carding, grist and shingle mills are located at these points.

Windsor, Ont.—A company has been formed to extend a street car line to Bar Point, a mile and a half below Amherstburg from Windsor. It is composed of Col. John Atkinson, E. W. Voigt, James Randall, of Detroit: William McGregor, M. P., Windsor, and W. D. Balfour, M. P. P., N. A. Coste, Thomas Ouellette, of Essex county. They have secured their charter from the Ontario government. The capital stock is $100,000, which has nearly all been subscribed. Their plan is to first extend the line to Bar Point and then to Harrow, Kingsville and Leamington. At Bar Point they have bought 200 acres of land which will be made into a summer resort. The charter provides for their main office to be in Windsor and a branch office in Ambertsburg. The construction of the track is to be commenced this spring. Architect Foster has made the plans for the road.

NEWS OF THE WEEK.

Geneva, N. Y.—The first car on the electric railway made a round trip between Geneva and Waterloo last week.

St. Louis, Mo.—Governor Stone has signed the Julian bill which compels cities to sell franchises to the highest bidder.

Enterprise, Miss.—S. H. Gelheman, of Springfield, Mass., and L. B. Bradley have been granted a franchise for an electric light plant and an electric railway.

Media, Pa.—A trolley road from the Baltimore Pike, connecting with the new trolley line at that point across to the Chester and Darby line and on to Lazaretto, is proposed.

Manchester, N. H.—It is announced positively that the electric railway to Lake Massabesic will be constructed during the summer. The preliminary work is already in progress.

Baltimore, Md.—It is stated that the Baltimore & Ohio Railroad is considering a project to install an electric system in the place of steam on the line between Bay Ridge and Annapolis.

St. Louis, Mo.—Mayor Walbridge has signed the bill passed by the municipal authorities which makes it a misdemeanor for a child under 15 years of age to jump on or off of a moving street car.

Tampa, Fla.—The Consumers' Electric Light and Street Railway Company has decided to build an extension to Ybor City. The operation of the new line will necessitate an increase in the power plant.

Pontiac, Mich.—A franchise for an electric street railway has been granted to a syndicate consisting of W. B. Mills and Geo. H. Barbour, of Detroit, and T. A. Smith, W. A. Henman and others of Pontiac.

Lowell, Mass.—The directors of the Nashua Street Railway Company have decided to build an extension of the road to connect Nashua with Lowell. The Nashua system will be equipped for electrical operation during the summer.

Rochester, N. Y.—The Charlotte & Manitou Railway Company proposes to expend $30,000 in improvements during the next few months. The company has recently obtained the contract for lighting the city of Charlotte by electricity.

New York, N. Y.—The North and East River Railway Company, which operates the line running across Fulton street, about one and a quarter miles in length, will shortly be absorbed by the Metropolitan Traction Company. The terms are not yet definitely fixed. Transfer will be made with the Broadway line.

Mount Vernon, N. Y.—Commissioner Cronin has granted the application of the New York Western & Connecticut Traction Company for a franchise to operate an electric road through the town of East Chester. A similar franchise has been granted to the Edenwald Street Railway Company, which will operate its line in Wakefield, East Chester and West Chester.

Providence, R. I.—One of the bills introduced in the House last week was an amendment to the law relating to offences against private property and provides that a fine of $3,000 or a term of two years' imprisonment may be inflicted as a penalty on persons who wantonly obstruct street cars, disturb the tracks, cut wires or pull down the poles of any street railway company.

Pittsburgh, Pa.—The directors of the Duquesne Traction Company are considering the construction of an electric line to Verona, Oakmont and Hulton. If it is built the road will be equipped with freight cars and a regular carrying trade will be done along the line. The country through which the proposed road will pass contains many truck farms. It is the object of the company to capture all this light freight, as well as the passenger travel, which is very heavy between the towns and Pittsburgh.

Niagara Falls.—The Niagara Falls & Lewiston Electric Railway Company has let the contract for the construction of its Niagara gorge road to Crage & Fench, of Buffalo, and the work will be at once begun and rapidly pushed to completion. It is expected that the line will be constructed, equipped and ready for operation by July 1 next. The road will be a double-track one, and the contract let to the Buffalo firm provides for the grading of the roadbed and laying the rails. Aside from this contract the railroad company buys its own materials, and has already contracted for a portion of what will be required.

Lancaster, Pa.—The street railway ordinance has been adopted by the Select and Common Councils. It grants to the Lancaster City Street Railway Company the right and privilege to make extensions of its railway tracks, and operate motor cars thereon; and grants permission to the Lancaster & Lititz Electric Railway Company, the Lancaster & New Holland Railway Company and the Lancaster & Terre Hill Street Railway Company to run their cars over the tracks of the Lancaster City Street Railway Company within the limits of the city of Lancaster, and to erect and maintain poles on certain streets in the city of Lancaster.

Lake Forest, Ill.—The County Board of Supervisors has granted to the promoters of the Interurban Electric Railway the right of way along the country roads of Lake County, under the condition that work amounting to a cost of $5,000 upon the proposed highway, extending from the county line north to Highland Park and from Fort Sheridan to the southern city limits of Lake Forest, be completed before July 1, and the line or road be in operation in one year from the date of the franchise. The Interurban Electric Road is to be a trolley line connecting Highland Park with Ravinia, two miles south, with another line running north from Highland Park through Highwood and Fort Sheridan and as far as Lake Forest.

Anderson, Ind.—A contract has been signed by the Marion Street Railway Company to Charles Henry, the head of the Henry Gas Belt Electric Railway Syndicate, whereby that company will take the Gas Belt Railway cars into Marion from Gas City for a period of 50 years. The syndicate has the right-of-way from Anderson to Summitville and but five miles now to cover on that line. It has the right-of-way secured on the 18-mile line from Anderson to Elwood and the right-of-way and town franchises on the Indianapolis line have been secured as far as Pendleton. The Marion and Elwood lines will be in operation, it is claimed, before fall and work on the Indianapolis line is to begin in time to have the line in operation by July 1, 1896. Another line 20 miles in length is being planned to go to Muncie.

Norristown, Pa.—Argument was heard by the Court last Monday, on exceptions to the approval of the bond tendered by the Bridgeport Railway Company to the Pennsylvania Railroad Company, to indemnify the exceptants for damages accruing by the occupancy of their land in Upper Merion township. Under the recent decision of the Supreme Court the trolley cars have been withdrawn from the Montgomery County Electric Railway from Swedesburg to Swedeland, a distance of a mile and a quarter. Last week the Bridgeport Railroad Company obtained a charter, under which it was proposed to appropriate land by right of eminent domain and operate the railway now idle. The question to be decided is one of vast importance to railroad and passenger railway companies, involving as it does the right to operate by electricity railroads created under the general railroad law.

Albany, N. Y.—The Railroad Committee of the Assembly has reported a substitute for the bills compelling fenders upon street surface railroad cars. It provides as follows: "Within 30 days after this section takes effect the Common Council of every city in this State may, and the State Railroad Commissioners must, adopt a good and sufficient guard fender or sweep to be used on electric or cable cars, so constructed as to remove, so far as possible, obstructions from the track or prevent injury to persons coming in contact with such cars. Every person or corporation operating a street surface railroad in any city in this State shall, on or before Sep. 1, 1895, cause each of its cars, propelled by electricity or cable, to be provided with the guard fender or sweep, if any, adopted by the Common Council of such city, and otherwise, with the guard fender or sweep adopted by the State Railroad Commission. Every person or corporation using or operating a car after Sep. 1, 1895, which is not equipped with a guard, fender or sweep as required by this section shall be liable to a penalty of $25 a day for each car so used, to be collected by the city and paid into the city treasury, to be applied to the improvement of the streets of said city."

PERSONALS.

Mr. E. F. de Witt, of Lansingburgh, N. Y., was in New York this week.

Mr. Frederick Sargent, of Sargent & Lundy, Chicago, was in New York this week.

Mr. William Robinson, of the Robinson Radial Truck Company, of Boston, was a New York visitor this week.

Mr. Charles T. Yerkes, president of the North and West Chicago Street Railroad Company, returned from Europe on the "Paris" last Saturday.

Mr. Charles F. Foster, late mechanical engineer of the Columbian Exposition and recently appointed chief of the engineering and electrical department of the Cotton States International Exposition, Atlanta, Ga., entered upon the duties of the position April 1. Mr. Foster will have full charge of the installation of machinery at the Exposition, for which position he is eminently fitted by reason of his experience at the World's Fair. Mr. Foster is a native of Boston, and his first engineering experience was gained in the office of the city engineer of that city. Abandoning the profession, however, he subsequently engaged in manufacturing, drifting to St. Louis, Mo., where he had charge of a large cotton mill; later he became identified with the Heine Safety Boiler Company, of which he was general manager when he resigned to take the position he occupied in the World's Fair.

TRADE NOTES.

A Gas-Motor Car for New York.—A street car, equipped with a Connelly gas motor, has been shipped to New York by the J. H. Vogan Car Manufacturing Company, of New Castle, Pa. It will be used upon the Second avenue surface line.

The National Switch & Signal Company, of Easton, Pa., has been awarded the contracts for interlocking the new terminals of the Brooklyn Elevated Railroad, at High street, Brooklyn, and for a plant for the Manhattan Beach division of the Long Island Railroad.

Berlin Iron Bridge Company's Contracts.—The iron roof trusses and purlins for the new electric light station at Marblehead, Mass., have been furnished by the Berlin Iron Bridge Company, of East Berlin, Conn. The Clyde Steamship Company has placed the order for its new pier shed with the same company. The building is 344 feet long and 124 feet wide, entirely of iron.

Annual Meeting of the Joseph Dixon Crucible Company.—The annual meeting of the stockholders of the Joseph Dixon Crucible Company, Jersey City, N. J., was held April 15. The detailed statement showing the millions of lead pencils, cakes of stove polish, crucibles, etc., manufactured, met the hearty approval of stockholders present, which manifested itself later on by the unanimous re-election of the board of directors and officers. Out of a total of 7,345 shares, 6,393 shares were represented in person or by proxy. The full number was cast for each of the following gentlemen: E. F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Alex. T. McGill, Jerome D. Gillett. After the stockholders' meeting had adjourned, the newly-elected board organized and unanimously re-elected: E. F. C. Young, president; John A. Walker, vice-president and treasurer; George E. Long, secretary. The Joseph Dixon Crucible Company, established in 1827, are the most extensive manufacturers of graphite products in the world. Their manufactures comprise plumbago crucibles, graphite facings, retorts and other goods used in foundries and smelting works; lubricating graphite, graphite greases, graphite paints and Dixon's American Graphite pencils, and carburet of iron stove polish. These goods meet ready sale in all the cities and towns of the civilized world.

The Walker Manufacturing Company, of Cleveland, O., has closed the following contracts since April 1, 1895, all for speedy deliveries. The popularity of its improved generators and motors is steadily gaining. The shops are now running day and night: St. Charles Street Railroad Company, New Orleans, La., three 200 K. W. direct coupled generators; Corning & Painted Post Street Railway Company, Corning, N. Y., two 125 K. W. direct coupled generators; Channon & Wheeler, Quincy, Ill., one 75 K. W. belted power generator; Manhattan Beach Hotel & Land Company, New York City; one 60 K W. belted lighting generator; Norfolk & Ocean View Railroad Company, Norfolk, Va., two 250 K. W. belted generators, three double car equipments, six 50 H. P. steel motors, and two double car equipments, four 30 H. P. steel motors; E. A. Darling, Superintendent Columbia College, New York City, one 50 K. W. belted lighting generator; Buffalo, Kenmore & Tonawanda Electric Railway Company, Buffalo, N. Y., two double car equipments, four 25 H. P steel motors; Stern & Silverman, Philadelphia, Pa., for Rapid Railway Company, Detroit, Mich., two 200 K. W. belted generators, and eight double car equipments, 16 50 H. P. steel motors; Dunkirk & Fredonia Railroad Company, Fredonia, N. Y., one double car equipment, two 25 H. P. steel motors; Schenley Park & Highlands Railway Company, Pittsburgh, Pa., three double car equipments, six 30 H. P. steel motors. There has also been a marked increase in the company's orders for general work as well as electrical work.

RECORD OF STREET RAILWAY PATENTS.

U. S. Patents Issued April 9, 1895.

536,999. Car Fender; George Blakistone, Baltimore, Md. Filed Oct. 29, 1891. A pivoted frame projects in front of the car and is provided with a flexible net. A second frame is pivoted to the first, provided with a net and standing approximately vertical when in use. A chain or cord, whose outer end is secured to the front frame, passes around a suitable part of the second frame, is attached at its other end to a suitable part of the car, whereby a resiliency of movement between the frames is attained. (See illustration.)

537,039. Switch Thrower; Sebastian Hoeninger, Milwaukee, Wis. Filed Dec. 20, 1893. This is a switch thrower for attachment to street cars. It comprises a vertically adjustable jointed rod, spring jaws fast on one section of the rod and embracing the other section of the same, and a suitable blade fast to the lower end of the rod.

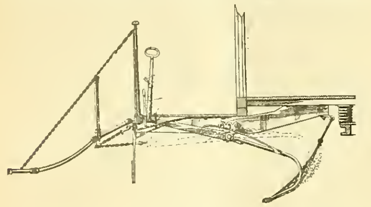
537,077. Automatic Railway Switch; Otto E. Seifert, Brooklyn, N. Y. Filed June 6, 1894. There is a pivoted switch tripping lever in combination with an automatic locking and also an automatic unlocking lever, each carried upon and pivoted to the switch tripping lever.

537,090. Fare Box and Register; Frank B. Wagner and Edwin L. Kramer, Cleveland, O. Filed April 23, 1894. A fare channel leads into the fare receptacle, and there is an inner and an outer gate in the fare channel. The register has a ratchet wheel upon its unit shaft, and a lever operates the inner gate and has a spring for returning it to its normal position and formed with a shouldered incline. There is a pawl upon the lever which engages the ratchet wheel upon the unit shaft of the register. A tumbler has a spring pawl riding upon the shouldered incline of the inner gate operating lever. There is a lever connected to operate the outer gate, and a thumb lever engages and rocks the tumbler and engages one arm of the outer gate operating lever.

537,171. Car-Fender; Elmer D. Abbott, Dayton, O. Filed Jan. 19, 1595. The fender is mounted below the platform, the outer side of which is provided with a cushion service that occupies a position coincident with the outer edge of the platform. A serrated rubber scraper is attached to the lower part of the fender. Hangers are mounted beneath the platform, with slots therein, and bolts are attached to the inner side of the fender and adapted to project through the slots, with means for making the bolts secure therein. Antifriction rollers are mounted in the hangers, against which said fender normally rests, and a vertical rod is secured to the fender, and to a hand lever. An auxiliary fender adjacent to the front wheels, and means are interposed between the auxiliary fender and the hand lever for lowering or raising the fender.

537,191. Wheel and Rail Brake; John Gibbons West Troy, Assignor, by direct and mesne assignments, of two-thirds to Stephen J. Brown, Troy, and John H. Jones, West Troy, N. Y. Filed Jan. 2, 1894. Means are provided for movably supporting the brake-shoes one in front and the other in rear of a car-wheel. There are a foot-lever and a hand-lever on one end of the car, and independent connections between the hand lever and one shoe, and between the foot-lever and the other shoe.

537,194. Conduit Electric Railway; John H. Guest, Boston, Mass. Filed June 18, 1894. A plate conductor is suspended to swing laterally and responsive to magnetic attraction. A current collector consisting of a magnet is hinged to the supporting arm of the collector and provided with a pole piece extending toward the conductor, a contact wheel being journaled in said pole piece and bearing upon the side of the conductor. (See illustration.)



No. 536,999.

537,195. Conduit Electric Railway; John H. Guest, Boston, Mass. Filed April 14, 1891. This is the combination with the railway tie or sleeper, and the conduit having a groove on its bottom, of a key piece attached to the tie.

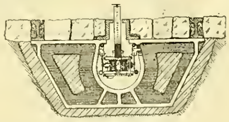
537,196. Supply System for Electrical Railways; John H. Guest, Boston, Mass. Filed June 18, 1894. There are two lines of working conductor beneath the car, exposed at the street surface and divided into sections and forming respectively the positive and negative sides of the sytem. The sections on one side of the system are arranged to break joint with the sections on the other, and automatic switches close the connection between the sections of working conductor and the power circuit and disconnect a section to the rear of the car.

537,197. Supply System for Electric Railways; John H. Guest, Boston, Mass. Filed Nov. 3, 1893. There is an electric switch for each section of the working contact or conductor, an actuating magnet or magnets being carried by a vehicle, and an armature connected to each switch whereby the switch may be actuated by a magnet on the car as the latter enters a section. A polarizing coil for the armature in the circuit is closed by the operation of the switch, and a mass of iron holds the switch armature in circuit closing position after the influence of the actuating magnet has ceased.

537,198. Electric Railway; John H. Guest, Boston, Mass. Filed Aug. 9, 1891 A plate conductor is suspended in the conduit and divided into sections, some of which are connected to the feeder. Contacts are so located as to be normally engaged by the sections, conductors leading from the contacts to other sections of the conductor. A current collector moves the sections out of engagement with the contacts when taking current from the sections so moved.

537,199. Electric-Railway Supply System; John H. Guest, Boston, Mass. Filed Feb. 20, 1894. Renewed Feb. 2, 1895.

537,200. Closed-Conduit Electric Railway; John H. Guest, Boston, Mass. Filed April 10, 1894. Fig. 4 read : "The combination of the stringer of insulating material holding the conductors and filled in with insulating material, the metal tubes resting on said stringer and containing the magnetic switches, electric connections from said switches passing through the cemented ends of said tubes for connection with the wires in the stringer, and a metal cover plate attached to the stringer over the connecting points."



No. 537,194

537,208. Station Indicator; Charles M. Kiler, Indianapolis, Ind., assignor, by direct and mesne assignments, to the Advertising and Station Indicator Company, same place. Filed June 11, 1891. Claim t reads as follows : "The combination, with a station indicator, of mechanism for operating the same in a forward and in a reverse direction, consisting of a ratchet wheel having a double series of teeth, the faces of which will be of reverse order in the two series, a reciprocating slide having two pawls adapted, the one to engage one of the series of teeth on the ratchet wheel, and the other to engage the teeth of the opposite series, means whereby the pawls may be thrown into engagement with the ratchet wheel as desired, so that when one of the pawls is thrown into engagement the other will be thrown out, said means consisting of a bifurcated lever pivotally secured to the slide and having the two ends of the bifurcated part extended to form bearings against the sides of the reciprocating pawls and having the opposite end of the lever extended to form a handle for turning the lever on its pivot, a spring to press the pawls against the bifurcated ends and a fastening by which the lever may be locked in any desired adjustment."

537,211. Car-Fender; Alfred H. Koeller, New York, N. Y. Filed Sept 11, 1894. A net is supported at the sides by levers turning on universal joints carried on the car. Flanged wheels run on the rails at the front of the fender, and springs extend longitudinally and connecting to arms extending downward from the car body, arranged to depress the levers to hold the wheels upon the track with a force which is diminished with the elevation of the fender, means being provided for lifting the front edge at will.

537,228. Cut-off or Safety Attachment for Electrical Conductors; James Parkinson, Maurice Springfield and Charles Mills, Philadelphia, Pa. Filed October 10, 1894. The attachment consists of a bridge piece, having a section pivoted thereto, an insulating piece attached to the section, a block pivoted to the insulating piece, a conductor leading from the block to the pivoted section, and normally in contact therewith, and another conductor attached to the pivoted section, which is intermediate to the insulating piece and bridge, the latter conductor being adapted to serve as a conveyer for the electric fluid in case of accident.

537,283. Trolley; Zachary T. Furbish and George A. Staples, Augusta, Me., assignor of one-third to P. M. Fogler, same place. Filed Sept. 25, 1891. A trolley wheel is mounted on a shank adapted to fit a pivoted socket. A spring holds the shank in normal position in the socket, and there are a spring and a connection between the lower end of the socket and the pole platform.

537,295. Car-Fender; Frederic J. Kranich, Providence, R. I. Filed June 23, 1891. A transverse shaft is rotatably mounted in bearings beneath the car-body, having a laterally-extending projection. Guide bars are pivoted on the shaft. The fender comprises side-plates having depending flanges and inclined ways on which the car-wheels may run, and a barrier connects the side-plates. Guides are pivoted to the side-plates and embrace the guide-bars, and chains connect the side plates with the shaft. A pilot member is pivotally supported at the forward end of the car, and a bolt is reciprocatingly mounted in bearings beneath the car, and is engaged by the pilot member, its rear end being located to engage the lateral projection on the shaft to prevent the rotation of the shaft, and to release the projection when drawn forward.

537,300. Railway Street and Station Indicator; Archibald B. Murray, San Rafael, and Henry G. Krasky, San Francisco, Cal. Filed July 23, 1891. The indicator is rotated by a spiral disk and mechanism and advanced upon a stationary shaft by power derived from the rotation of the car axle. There are protuberances upon the periphery of the disk, and a lever is adapted to travel in contact with the periphery of the disk and to be raised whenever it passes over one of the protuberances. There is a corresponding lever upon the opposite side of the fulcrum shaft and a plate with which the lever is connected has its lower end beveled or inclined. A pawl and ratchet mechanism is actuated by the vertical movement of the inclined plate, and a drum or cylinder carries hinged plates having marked thereon the names of the streets or stations which are successively exposed by the rotation of the drum when actuated by the pawl and ratchet mechanism.

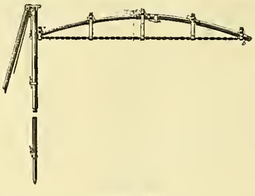
537,406. Car-Fender; Anthony P. Cadden, Baltimore Md., assignor of one-half to Francis J. Hayden, same place. Filed Jan. 3, 1895. Two vertical side bars are bolted to the front of the car-body, and two horizontal side bars are secured at their rear ends to the vertical bars by hinges. A bar extends across and connects the front ends of the horizontal side bars, and a number of straight flat spring-slats extend at right angles to each other and connect with the side bars and crossbar, the slats being interwoven and forming a spring platform having at its rear an opening, to allow a coupling head to project through when the platform is turned up. There is an inclined chain at each side of and above the platform and an inclined network apron attached to the chains. A detachable arm is secured at the front end of each of the horizontal sids bars and projects in advance of the front crossbar; and tubular flexible hose extending across in front of the crossbar is secured to the detachable arms.

537,315. Car Attachment; Paul M. A. Stemmler Walden, N. Y., assignor of one-half to Charles E. Van Amburg, same place Filed Nov. 17, 1894. A lever is connected at one end to the brake block and at the other end to the fender, so that when the fender is moved it actuates the brake block. A hook is adapted to engage the lever, and hold the brake block out of operative position, and means actuated by the movement of the fender disengage the hook from the lever.

537,320. Adjustable Truss Hose-Bridge; Samuel F. Sullivan, Pittsburgh, Pa., assignor of five-eighths to Thomas W. Aisbitt, same place. Filed Sept. 13, 1894. The truss-bridge for fire hose is constructed with two or more curved sections, adapted to slide one upon the other, a flexible chord uniting the outer ends of two of the sections, and upright members connecting with the flexible chord and the curved sections. See (illustration.)

537,409. Railroad Rail-Joint Box. Charles Dickenson, Washington, D. C. Filed Aug. 15, 1894. An open bottom box or trap is secured to each face of the webs of the rails at the joint by bolts and nuts, the heads of the bolts and points and the securing nuts upon the points being located within the open bottom boxes or traps, at the sides of the rail-joint.

537,414. Closed Conduit Electric Railway; John H. Guest, Brooklyn, N. Y. Filed Feb. 17, 1893. Feed wires connect the sectional contact conductor, and electro-magnetic switches are located at a common point and adapted to connect the feeders with a source of power. A magnetizable circuit closer is contained in a sealed chamber on the roadbed for each section, and controls the circuits of the switch-controlling magnet or magnets, an electro-magnet being carried by the car for operating the magnetizable circuit closer.



No. 537,320.

537,415. Supply System for Electric Railways; John H. Guest, Boston, Mass. Filed July 6, 1893. Several feed wires connect with the working conductor sections. There is a rotary electro-magnetic switch and a step by-step mechanism therefor. A controlling magnet operates the step-by-step mechanism, and is located in a circuit in series with the car motor. A traveling contact is connected to the switch for completing the connection of the controlling magnet in succession with the feeders and the car motor, and arranged to connect with the feeder segment to which the switch moves when it operates and to break the connection of the preceding feeder segment.

537,416. Supply System for Electric Railways; John H. Guest, Boston, Mass. Filed October 12, 1891. The sealed conduit containing the switch-boxes and the sectional working conductor is formed of contact rails supported upon the conduit edge.

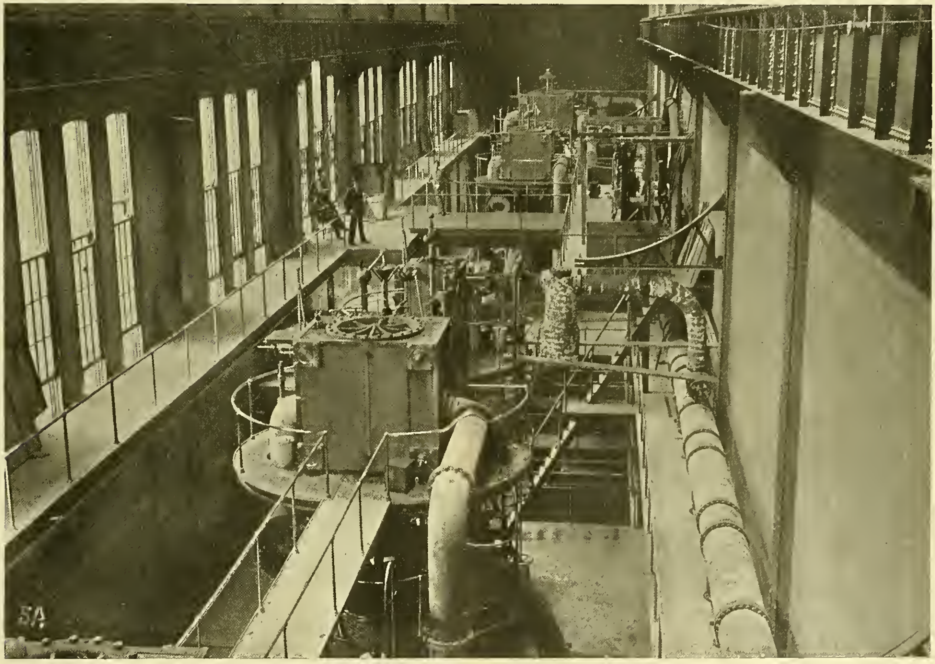
Street Railway Gazette.

Vol. XII. NEW YORK, APRIL 27, 1895. No. 17.

The Metropolitan Electric Elevated Railway of Chicago.

The Metropolitan West Side Elevated Railway Company of Chicago, which is to introduce modern transportation in a district in that city heretofore dependent largely upon horse cars, sent out the first train over the completed portion of its system last week. No small amount of significance attaches to this event, the road being the first complete elevated railway on this side of the Atlantic to be operated by electricity with the exception of the Intramural Line at the World's Fair.

The first train operated over the line carried a special party of visitors who were given an opportunity to inspect the characteristic features of the installation. The sight of a train in actual operation was one of great interest to residents along the line who have been waiting impatiently for some months for the opening of the road.

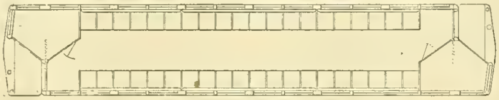


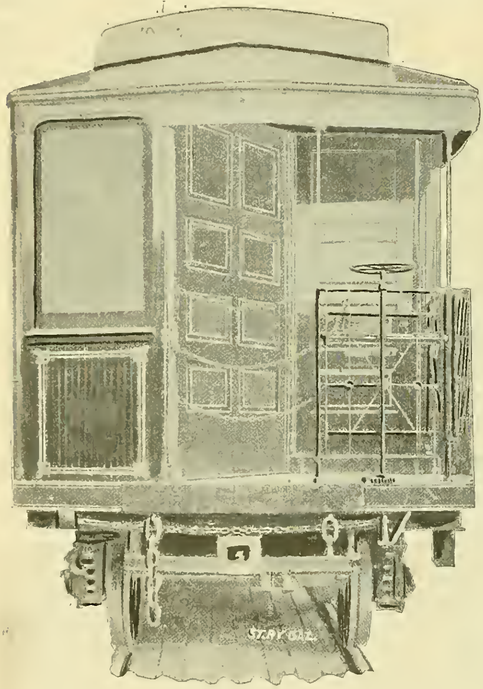
Power Plant, Viewed from Traveling Crane.

The Metropolitan Railway was projected by A. F. Walcott and was promoted by him. He organized the West Side Construction Company with a capital of $3,000,000, which was subscribed for at par. The company sold at the same time $10,000,000 five per cent. fifty-year bonds at 90. The amount thus realized, $12,000,000, was ample for the construction of the railway and for the purchase of the land on which it was built. Like the South Side Rapid Transit Railway—the Alley L—the Metropolitan road is built entirely on its own property.

The Metropolitan Company will eventually operate an extensive system of electric elevated lines on the west side of Chicago. The terminal station will be located on Franklin street on the east side of the Chicago River, between Jackson and Van Buren streets. As the terminal has not yet been finished, trains will run only as far east as Canal street, which is the first street west of the river. This temporary terminus is over half a mile from the business center. The Franklin street terminal station is, in fact, located on the outskirts of the central business district. It is probable, however, that within a comparatively short time a downtown loop connecting the terminals of all the elevated railways in Chicago will be in course of construction, and when this improvement is made the convenience of the public will be greatly promoted. At the present time the terminals of all the elevated railways are located at a considerable distance away from the central business district.

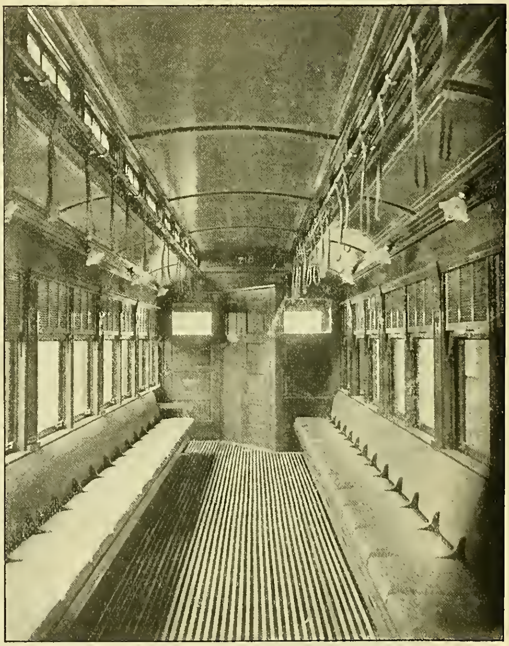
The mileage of the several divisions of the Metropolitan system is as follows: The main line, 1.8 miles - Garfield Park line, 4.2 miles; Douglas Park line, 3.7 miles; Logan Square line, 4.49 miles, and Humboldt Park line, 2.13 miles. The main line extends from the downtown terminal as far west as Paulina street and it is equipped with four tracks. The trains of all the branches will follow this line its entire distance. The Garfield Park line is practically a continuation of the main line, and extends directly west to West 48th street. The Douglas Park line turns to the west and south, and the Humboldt Park and Logan Square lines extend northwest. All these lines are not, as yet, fully completed. The main line and the Garfield Park line are finished and the Humboldt Park and Logan Square lines are ready for operation as far as Wicker Park. Forty-three stations will be located on the main line and the several branches as follows: Main line, 5; Garfield Park line, 3; Douglas Park line, 11; Logan Square line, 9; Humboldt Park line, 5. The stations are all built of rock-faced pressed brick with stone trimmings, and no expense has been spared to make them meet the convenience of the patrons of the road. They are regarded as the finest structures for the purpose that have ever been constructed.


PLAN OF MOTOR CAR.


MOTOR CAR.

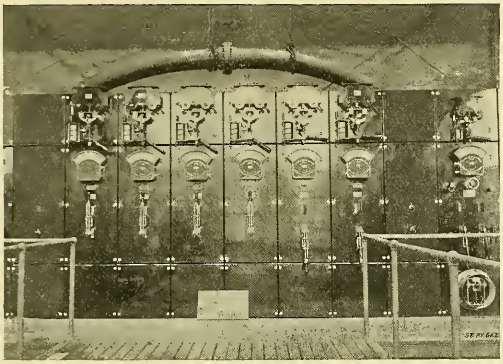
The rolling stock of the line will at first consist of 55 motor cars and 100 trailers. A plan view of one of the motor cars which were built by the Barney & Smith Car Company, of Dayton, O., is shown in one of the illustrations. These cars furnish accommodations for smokers. The two cabs provided for the motorman, located at diagonally opposite corners of the car, are built out on the platforms as far as the hood will permit. This construction makes it necessary to locate the entrance doors next to the corner posts, and, as it was thought desirable to make them of the sliding type, they are pushed back into the cab; this, however, does not interfere with the motorman, as the front door is always locked. The weight of the car exclusive of the electrical equipment is about 20 tons. The car body is 40 feet in length over sills and 47 feet 2¾ inches over platforms. Its characteristic feature is a steel sub-frame, which it was thought necessary to add so that the car would be strong enough to pull six loaded 40-foot trailers. It was also thought advisable to add extra weight for traction purposes. The sub-frame is constructed of two nine-inch I beams located immediately under the side sill of the body.

Each motor car is equipped with two motors that are known as the G. E. 2,000. They are similar in design and construction to the G. E. 800, but of larger capacity and of more substantial construction. The controller is similar to the type K controller, but modified for the heavier service for which it is to be applied.

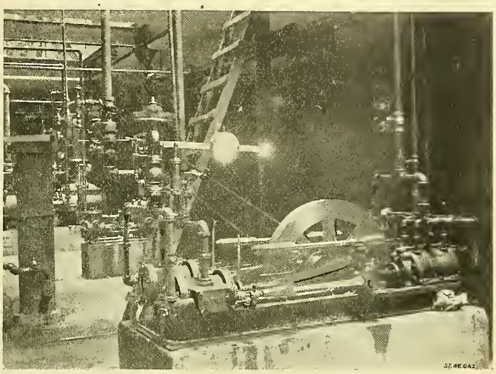

INTERIOR OF MOTOR CAR.

The trail cars were manufactured by the Pullman Palace Car Company, of Chicago, and are designed to furnish seating capacity for 48 passengers. The exterior coloring is the standard Pullman type and the inside finish is in mahogany with decorated ceilings. All the cars are to be electrically lighted and heated. The heaters will be supplied by the Central Electric Heating Company.

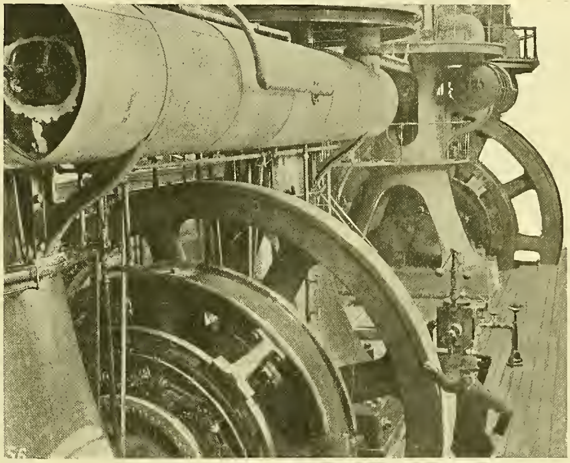
The road will resemble in many particulars the Intramural Railway at the World's Fair. As in that road, the current will be conducted by a third rail and will be picked up by a sliding shoe, which is practically the same as that used on the cars on the Intramural road. A good contact is maintained by the spring attachment, and very little sparking occurs. Each motor car is equipped with a sliding shoe on either side. If, for example, the motor car is going north, the right trolley will be in circuit. Where a cross-over is to be passed the momentum of the car will carry it over, but when it strikes the south track the shoe on the left side will be thrown in circuit. Each motor car has its controller, pump and trolley contacts in duplicate, that is, at each end, so there is no necessity for loops at the terminals.



Switchboard.



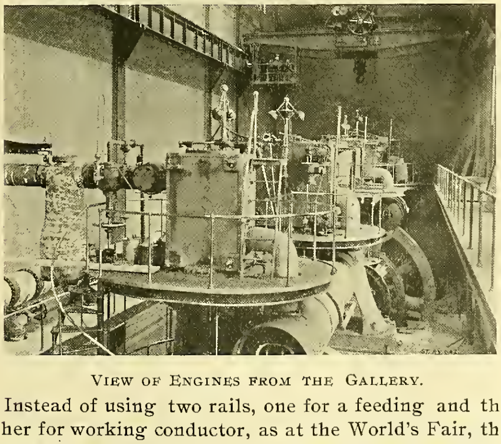
Pumping Plant.



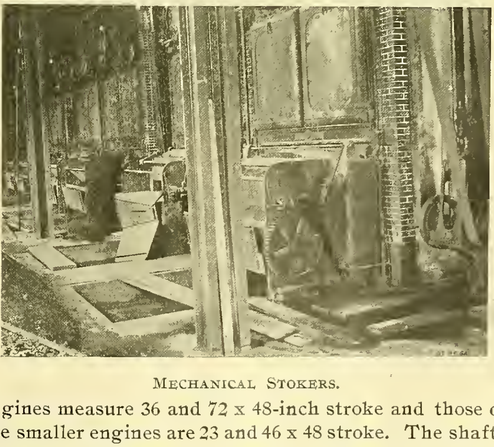
Detail of Generator.

As in the Intramural line a third rail is used as the working conductor, the structure being used for return circuit. The track rails are carefully bonded by two copper strips, one on each side, of extra large cross-section, riveted cold through holes in the web.

Instead of using two rails, one for a feeding and the other for working conductor, as at the World's Fair, the engineers have used a single rail for the conductor and heavy cables are used as feeders.



View of Engines from the Gallery.



Mechanical Stokers.

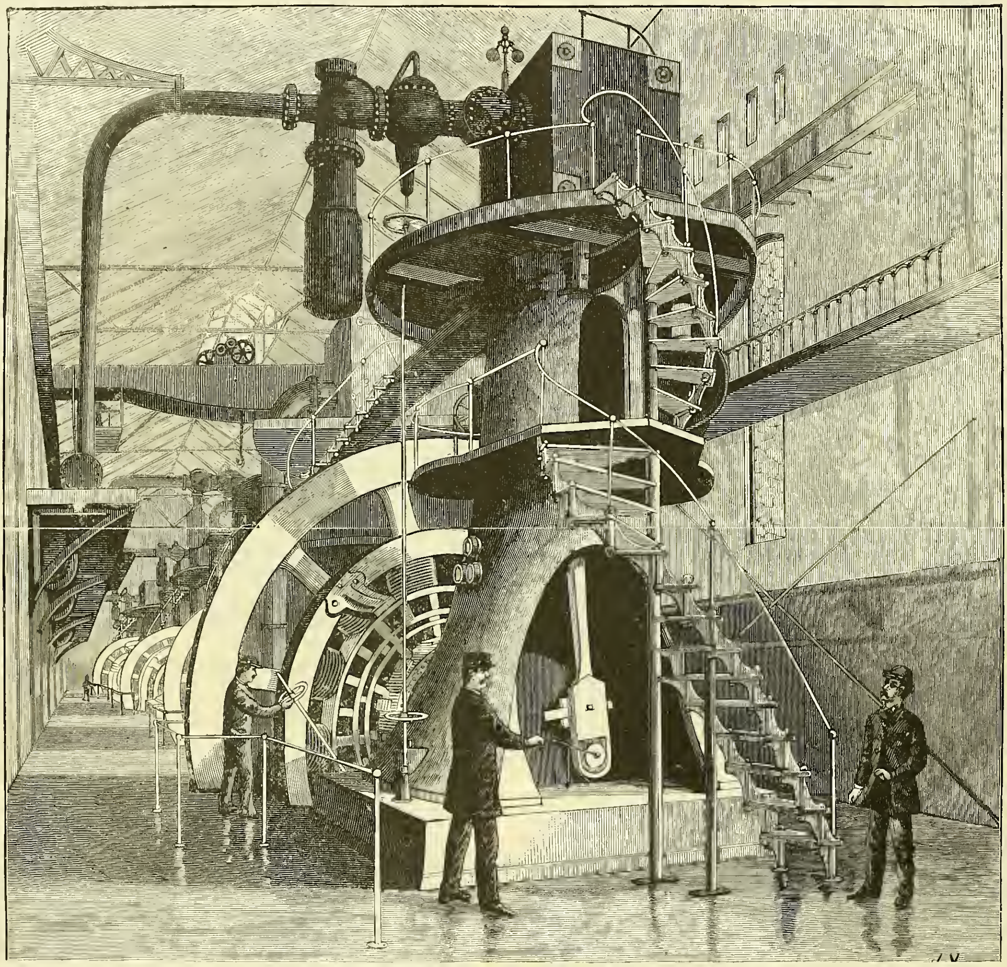
The power station, which is located west of the municipal lighting station on Throop street near Van Buren street, was designed by the general superintendent, W. E. Baker, for an ultimate capacity of 3,000 hp. Its design is such that it can be doubled in size by an extension to the street, as the site of the city lighting station has been purchased by the company. The building is 300 feet in length and 90 feet in width.

The machinery foundations are constructed of brick and concrete. The engines, which will be six in number, are all of the vertical Corliss type and were constructed by the E. P. Allis Company, of Milwaukee, Wis. Four engines, two of 1,000 hp. and two of 2,000 hp. each, have been installed. The cylinders of the larger engines measure 36 and 72 x 48-inch stroke and those of the smaller engines are 23 and 46 x 48 stroke. The shafts of the larger engines are 24 inches in diameter; the journals 22 inches in diameter and the fly wheel is 24 feet in diameter and weighs 70 tons. The shaft of the smaller engine is 20 inches in diameter, the journals 18 inches in diameter and the fly-wheel, which is 18 feet in diameter, weighs 35 tons. The larger engines will run at 75 revolutions per minute and the smaller at 100 revolutions per minute. The generators, which are directly coupled to the engine shafts, are of the standard General Electric slow-speed multipolar type. Two generators are of a capacity of 1,500 kilowatts and two of 800 kilowatts capacity.

The switchboard, which is of the latest design manufactured by the General Electric Company, is composed of the generator and feeder panels. The former are 24 inches wide, and are equipped with the latest types of instruments, including a recording watt meter and lightning arresters.

The boilers, which were supplied by the Babcock & Wilcox Company, of New York, are arranged in six batteries of two boilers each, each boiler being of a capacity of 300 hp. and are provided with mechanical stokers. The arrangements for receiving fuel are very convenient. Coal is dumped directly from the cars into shutes, which convey it directly to the boiler room. The furnaces are provided with smoke-consuming devices, which seem to operate very successfully. The ashes are mechanically removed from the rear.

Following are the officers of the company: President, Robert E. Jenkins; secretary, George Higginson; general counsel, W. W. Gurley; general superintendent, W. E. Baker; superintendent of transportation, A. S. Jones; electrical engineer, H. M. Brinckerhoff.

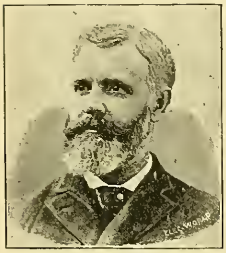


Generator and Engine Room.

Street Railway Freight Service.

The Pennsylvania House of Representatives has passed a bill permitting street railway companies to carry freight. The measure provides that all limitations contained in charters heretofore granted, restraining companies from organizing a freight service, shall be repealed. The bill passed the House by a large majority, and is now before the Senate.

Death of William J. Richardson.



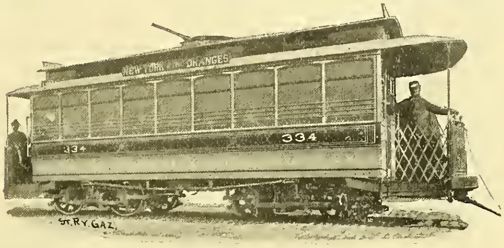
William J. Richardson, of Brooklyn, secretary of the American Street Railway Association, died Friday, April 26th, of spinal meningitis. Mr. Richardson had been seriously ill for nearly two months, but a fatal termination was not feared until a short time before his death. Mr. Richardson's illness dates from the time of the street railway strike in Brooklyn. He was subjected to especial worry by the position in which he was placed. As director of the Atlantic Avenue Railroad Company he was anxious to see it protected; as president of a benefit association of the employees he desired to see the men's interests promoted. The two interests seemed to clash. To Mr. Richardson's great sorrow, and to his worry over the ensuing complications, his illness was ascribed.

Mr. Richardson was the son of the late William Richardson. He was born in the city of Albany, N. Y., Oct. 22d, forty-six years ago. His early education was secured at the State Normal School there, and after passing from the lowest to the highest department in the school he went to the principal business college of the city. In 1864 his father was made president of the Dry Dock, East Broadway & Battery Railroad, in New York city, and with his family moved to New York. In 1867 the late William Richardson secured control of the Brooklyn & Jamaica Railroad Company, and his son was his assistant. After two years in the railroad business he desired to devote himself for a time to study, and attended the Polytechnic Collegiate Institute in Brooklyn for three years. When the Atlantic Avenue Railroad Company was organized to operate the various lines in which Mr. Richardson was interested, William J. Richardson was elected secretary, and filled that position with ability until the reorganization of the company put new men in control, who substituted friends of their own. Mr. Richardson was secretary of the American Street Railway Association, and conducted its affairs with rare fidelity and intelligence.

New Cars of The Consolidated Traction Company of New Jersey.

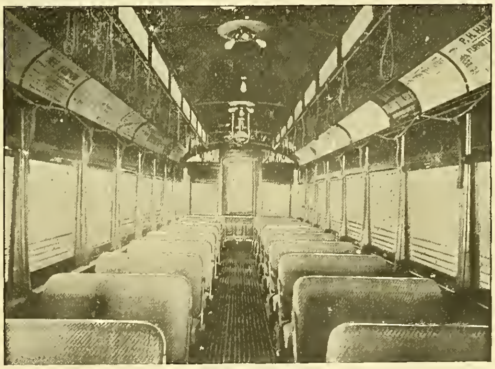
The accompanying illustration shows the interior of one of the new double truck cars with which the Consolidated Traction Company of New Jersey has recently equipped its Newark and New York line. The car bodies are 35 feet in length, and were built by the Laclede Car Company, of St. Louis, Mo. They are mounted on double trucks furnished by the J. G. Brill Co., of Philadelphia, Pa., and are equipped with G. E. 800 motors.

There are nine comfortable rattan covered reversible seats on each side of the car, each of sufficient size to afford ample room for two persons, thus affording a total seating capacity for 36 passengers. The seats were manufactured by the Hale & Kilburn Manufacturing Company, of Philadelphia, Pa. The interiors are handsomely finished and decorated. The window sashes and doors are of cherry finish in the natural color. The ceilings are of bird's-eye maple with handsome scroll work decorations in silver and gold. The ventilator shafts are of pressed glass which extends the full length of the monitor roof, and is of a color that harmonizes with the bird's-eye maple ceiling. The cars are illuminated by four single lamps and two groups of three lights each. At each end of the car one of the single lamps is located in the centre of the monitor roof in proximity to a colored signal light. In addition to the electric lights the cars are provided with two ornamental brass oil lamps.



Exterior of Car.

The car exteriors are handsomely finished and decorated. The main panel is red, with figures and ornaments in gold, and the lower panels are white with silver letters. The cars are provided with Burrowes spring roller curtains, Vernon fare registers and Field fenders. The cars have been in operation about a month, and are very popular with the passengers. They are run under six minutes' headway, and the trip from Newark to the Jersey City ferry is made in 45 minutes. Since the opening of the line there has been a steady increase in the number of passengers carried. With the introduction of new cars and the short headway, no doubt the amount of business will be materially increased. The company has recently established a ticket office at the foot of Cortlandt street, New York, near the ferry, where tickets to Newark, including the ferry fare, are sold for ten cents.



Interior of Car.

A Marvellous Discovery!

According to the Buffalo *Express*, Nikola Tesla has made further improvements in his method of transmitting electricity by fluid, and has declared that he is certain the current could be sent from Niagara to New Orleans economically as compared with local generation by steam!

Transportation for the Paris Exhibition of 1900.

The authorities of the Paris Exhibition of 1900 have already begun to devote considerable attention to the matter of providing adequate means of transportation. The problem, so far as it relates to the exhibition ground, is not difficult of solution. It has already been determined to promote the convenience of visitors by building a complete network of electric lines. The difficulty of providing suitable transportation facilities to accommodate visitors in reaching and leaving the grounds from different parts of Paris has proved to be very great.

In a recent issue *Engineering*, of London, refers to the matter somewhat at length. With the exception of Gare St. Lazare, it says, none of the railway companies have terminal facilities near the center of the city, the stations being located almost in the exterior, and there exist none of the facilities which make circulation in London easy. The cabs of Paris have become, somewhat unjustly, perhaps, a byeword and a reproach ; the omnibuses and tramways are fettered by a deplorable monopoly. In one respect, indeed, Paris possesses great advantages over London as regards passenger transport. The Seine is better utilized than the Thames, and the service of the small steamboats is admirable, cheap and able to handle large numbers of persons. But neither this nor the cabs, omnibuses or tramways combined will be capable, no matter how much they are increased, of handling the vast movement that may be reasonably anticipated in 1900. The Paris omnibuses, including those of the suburban lines, carry about 257,000,000 of passengers a year, and the Seine steamers transport about 24,500,000. But these figures represent the ordinary movement of the city, and must be regarded by the light of the constant complaints of inefficiency that have been common in Paris for years past. During the exceptional conditions for an exhibition year, these means of transport must be regarded as practically non-existent. The desirability of metropolitan railway communication in Paris has, of course, long been recognized, and that it does not now exist is not the fault of earnest advocates and workers ; but there have been too many obstacles and vested interests to permit the efforts made to take effect. At the present time the Paris omnibus system is being largely extended, but the utmost that can be expected from this will be a partial relief to normal inconveniences, the more so as all the lines are in the hands of one company, and with monopoly, competition is out of the question. As we just said, the difficulties of transport are very strongly accentuated during an exposition year, and that this was so during 1889 will still be a vivid recollection in the minds of many thousands. There are some curious statistics bearing on this subject in a book just published in Paris, with the title of "An Historical and Statistical Essay on the Means of Transport in Paris." During the year 1888, the omnibus and tramway lines carried 242,000,000 of passengers ; during the following year, six months of which was occupied with the exhibition, 270,000,000 were transported. On the Seine 15,000,000 were carried in 1888, and in 1889 this number was increased to 33,000,000. By the least sanguine estimate the visitors to the Exhibition of 1900 will be far more numerous than they were in 1889. Steadily increasing attendance is one of the features of all great international exhibitions. Thus in 1855, for example, Paris was proud to record as a maximum of visitors on the most crowded day, a total of 26,000, while in 1867 the corresponding number was 47,000, in 1878 it was 83,000 and in 1889 the maximum was 154,000. The great day at Chicago in 1893 brought 716,000 visitors.

The very difficult task of improving the means of transport by 1900 is in the hands of M. Picard, who is now actively engaged in considering the problem. It is already a year since M. Picard urged on the Commission the pressing importance of urging the public authorities to take the steps necessary for insuring ample and rapid communication between the site of the Exhibition and various quarters of the city, particularly by the construction of connecting railways between the chief Paris terminals. As a result of this the Department of the Travaux Publics prepared a project for a metropolitan line connecting the center of the city with the principal termini, and also with the Exhibition grounds. Unfortunately this project appears to have been quite abandoned, partly, we believe, because it was considered that the time for completing the work was insufficient. The occasion, however, would have been an excellent one to have conferred on Paris the permanent advantage of improved transport facilities. The directors of the 1900 Exhibition have lately prepared a general plan of means of communication which it is hoped will relieve a part of the most pressing inconveniences. New lines of tramways will probably be laid down, and these undoubtedly will be worked electrically. They will not extend actually to the gate of the Exhibition, but will be stopped some distance from it, to avoid inconvenient crowding. The number of boats on the Seine will be increased considerably ; they afford always a popular and generally an agreeable means of coming to and leaving the Exhibition grounds. Lastly, it is expected that, though the project for a general metropolitan scheme has been abandoned, certain lines will be extended as near as possible to the Exhibition. A new railway, it is expected, will be made, joining the Chemin de Fer du Ceinture with the Champ de Mars ; another will extend to the Esplanade des Invalides ; and probably this will be extended as far as the Luxembourg station of the new underground line of the Paris & Orleans Company, and it is possible that the two stations on the east of Paris will be connected—the termini of the Paris & Orleans and the Paris, Lyon & Mediterranee railways. It is also intended to construct, down on the right bank of the Seine, chiefly beneath the Rue de Rivoli, a tubular railway, presumably at a low level. How far these schemes, and others, will be carried into execution by the year 1900 remains to be seen, but we have said enough to show that the all-important question of transport facilities is engaging the earnest attention of the Exhibition authorities.

Street Railway Change in Brooklyn.

Henry W. Slocum, president of the Coney Island & Brooklyn Street Railway Company, has presented his resignation to the board of directors. Mr. Slocum retired, it is said, because he found that his duties as an executive officer of the company took too great a portion of his time. The resignation will probably not take effect for several weeks.

Street Railway Engineers.—I.

CHARLES F. UEBELACKER.

The accompanying portrait is that of Mr. Charles F. Uebelacker, electrical engineer of the Consolidated Traction Company of New Jersey. Although a young man, Mr. Uebelacker has had no little experience in electrical work, and he has had exceptional opportunities for obtaining broad and accurate technical and practical knowledge of electrical street railway machinery. He was graduated from Princeton in the class of 1890, and immediately secured a position with the Brush Electric Company, of Cleveland, O. He showed marked aptitude for the work, and was soon placed in charge of the entire mechanical arrangement of the shops. He planned a number of new and valuable features in the plant which led to marked economy. Somewhat later, when the manufacture of the Short electric railway apparatus was undertaken in the shops of the Brush Electric Company he became Prof. Short's private technical assistant, and performed a great deal of valuable work in connection with the development of the Short railway system. Leaving the Short Company in 1892, Mr. Uebelacker was associated with Prof. E. P. Roberts, of Cleveland, in the firm of E. P. Roberts & Co., independent consulting engineers. Subsequently, he accepted a position with the Consolidated Traction Company a little over two years ago. He has been rapidly promoted, as his engineering ability and readiness to solve the many practical every-day problems encountered in electric railway practice, caused the company to set a high value on his services. He held for some time the position of division superintendent of the Newark & New York line, and last fall was appointed to the position which he now holds. Mr. Uebelacker's success in the street railway field is, beyond a doubt, due to the fact that he is possessed of extensive technical knowledge combined with wide practical experience.

CHARLES F. UEBELACKER.

Suit Against Elevated Road Dismissed.

The suit of Gen. Serrell against the Kings County Elevated Railroad Company, of Brooklyn, was dismissed by Judge Beekman in New York City a few days ago. The case had been on trial for four days and the court decided that the evidence was insufficient to warrant him in sending it to the jury. The suit was brought to recover $200,000, alleged to be due the plaintiff on account of services rendered by him as an engineer of the elevated road in preparing plans, obtaining consents of property owners for rights of way and in supervising the construction of the road.

In Favor of the Gettysburg Railway.

In Philadelphia last week Judge Dallas handed down a decision in favor of the Gettysburg Electric Railway Company, in the controversy that has grown out of the condemnation by the United States of the land forming part of the railway company's right of way for the Gettysburg Battlefield Park. Judge Dallas holds that the government does not possess the right in this instance to condemn the land. He says that while the right of the United States to take property for public use is fully recognized, it cannot be exercised within the limits of the several states for any purpose which is not incident to some power delegated to the general government. In the present instance, he argues, while the end sought to be promoted was one that commended itself highly to patriotic sentiment, such feeling might not be indulged in, for this was a case in which justice was to be judiciously administered without respect to persons, and where the constitution of the United States must be regarded as prescribing the paramount rule of civil conduct as well for the government as for the people. He finds that the object of the petitions for the condemnation of the property were not germane to the execution of any power vested in the general government. The powers of Congress, he states, were distinctly enumerated in the constitution and in none was included such a matter as the condemnation of the Gettysburg land, and it could not be, in the opinion of the court, without enlarging the constitutional grant by grafting upon its express terms a construction so lax and comprehensive as to be subversive of it.

Sale of the Little Rock Street Railway.

The street railway system of Little Rock, Ark., was sold at auction last week in accordance with a decree of the United States Circuit Court. The property was bid in by Henry C. Haarstick, vice-president of the City Electric Railway Company.

The itemized amounts realized from the sale were as follows: Capital Street Road, $291,000; Glenwood park, $15,200; West End park, $39,000; other real estate, $7,800; City Electric Street Railway and franchise, $290,000. Total, $636,000.

Before the sale was concluded Judge John McClure, representing the First National Bank of Little Rock, gave formal notice that he objected to the completion of the transaction. He objected that the sale was not conducted in accordance with the decree of the court, and that the master who had charge of it was not vested with proper authority. He also stated that the decree under which the sale was taking place was superseded, inasmuch as an appeal had been taken.

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As THE ONLY WEEKLY PUBLICATION in the world DEVOTED TO THE STREET RAILWAY INDUSTRY, and the only journal adequately treating THE NUMEROUS TECHNICAL FEATURES INVOLVED IN ITS MODERN DEVELOPMENT AND PRACTICE, the "Street Railway Gazette" aims to worthily represent the activity and progressiveness of the important interests to which it is devoted. Presenting ALL THE NEWS EVERY WEEK, and describing CURRENT IMPROVEMENTS AND DEVELOPMENTS immediately upon being brought forward, its pages offer to those engaged in the street railway field the TIMELY ADVANTAGES ENJOYED IN OTHER ACTIVE AND IMPORTANT BRANCHES OF MODERN INDUSTRY, and to advertisers A LIVE AND ENERGETIC MEDIUM commensurate with their needs and one giving CLOSEST ACCESS TO THE COMMERCIAL OPPORTUNITIES OF AN EXTENSIVE AND GROWING BUSINESS.

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AS TO THE FUTURE.

With this number the Street Railway Gazette passes under new management, and the occasion affords an opportunity to say a few words as to the policy which is to guide the paper in the future. One of the features that will be considered essential is that of timeliness, both with respect to what appears in the news columns and also as regards the technical matter. No effort will, therefore, be spared in this, as well as in other directions, to make the Gazette truly representative of the progressiveness, enterprise and activity so characteristic of the modern street railway industry. The articles will be by practical men for practical men, and, while written in plain and simple language, will be technically accurate, and of such a character as to be of the greatest every-day value to the audience addressed, both at the time and as a preparation for a more thorough understanding of subsequent advances in street railway development. More illustrations will be used than formerly, and special attention will be paid to the treatment, as they arise, of the latest questions affecting street railways; with this end in view contributions of a practical character from the pens of the most competent writers will be published. In the new departure the co-operation and assistance of both street railway officers and employees will be highly appreciated, and information as to changes and extensions of systems and other items of news, articles for publication and suggestions as to the direction in which the paper can be improved will always be welcomed. That the office from which the Gazette will hereafter be issued is fully equipped to furnish good service in this line, most readers of the paper already know. In addition, the assurance on our part is offered that the same persistent and painstaking work will be bestowed in the present case that has produced such excellent results under the same management in another and closely allied branch of technical journalism, the purpose being to fully merit in every particular the support which is solicited.

FREIGHT SERVICE ON ELECTRIC LINE.

The bill authorizing street railway companies in Pennsylvania to carry freight has passed the House at Harrisburg, and it seems likely that it will receive favorable consideration in the Senate. The fact is not surprising, for the measure is a popular one, especially in the country districts, in behalf of which, indeed, it was introduced. One of the great needs in rural districts is better transportation, and electric railway companies in Pennsylvania are preparing to meet the urgent demand. The mileage of rural lines in the State is already considerable, and a vast number of similar enterprises is projected. The opportunity for local travel that is thus opened makes life less isolated and residence in country districts so much the more desirable, but the farmer is far-sighted enough to see a financial as well as a social advantage that may accrue to him from the operation of these local lines. If they are allowed to carry freight as well as passengers he can reach desirable markets which are, with the existing transportation facilities, not conveniently accessible. Just at the present time the companies have received a setback as a result of the recent unfavorable decision of the Supreme Court, which held that the electric railway companies did not possess the right of eminent domain and that authorities in rural districts had no right to give franchises on country roads. The obstacle, however, cannot be more than temporary. As the demand for better transportation grows more clamorous the legislature is bound to make such provision as will make possible under the law the extension of trolley freight and passenger systems.

ELECTRIC ELEVATED RAILWAYS.

The first complete elevated railway to be operated by electricity on this side of the Atlantic was the Intramural line at the World's Columbian Exposition, in Chicago. While this installation was a temporary one, it served its purpose admirably in carrying the throngs of visitors to the World's Fair, and at the same time it demonstrated conclusively the advantages attending the operation of an elevated road by electricity. The success of the line was such that it led to the electrical equipment of the Metropolitan West Side Elevated Railway, which has just been opened in Chicago, and to that city, therefore, belongs the honor of constructing the second as well as the first railway of this type in the country. The directors of the company were originally strongly in favor of adopting steam locomotives and conforming to the practice of the Manhattan elevated railway in New York city; in fact, we believe, they committed themselves to that plan by contracting for an instalment of locomotives, but the order was subsequently canceled, as the investigation of a committee disclosed the advantages of electricity as applied to the operation of an elevated road. The Metropolitan installation can in nowise be considered an experimental one, and that it will be successful is a foregone conclusion. There can be little doubt that other elevated railway companies will, in the near future, follow the example of the Metropolitan and abandon steam for electricity. The absence of noise, smoke and dirt are features of an electric elevated railway that strongly appeal to the public, while the matter of economy in operation is one that every railway company will strongly appreciate.

DEATH OF WILLIAM J. RICHARDSON.

With the death of William J. Richardson, of Brooklyn, one of the most familiar figures in the street railway field in this country passes away. To street railway men he was best known as secretary of the American Street Railway Association, and he was far more closely identified with that organization than any of its officers; he was deeply interested in its work, and to his intelligent and faithful efforts much of its marked success is to be attributed. He was an able and experienced street railway man, greatly interested in the development of the street railway, intimately acquainted with all the details of management, keenly alive to new ideas for the improvement of the service. It is doubtless true, however, that Mr. Richardson would prefer to be remembered not as a street railway official, but for the efforts he put forth in behalf of the humbler workers in the street railway field, for he did not confine his interest to street railway management and operation. He took an absorbing interest in the welfare of the employees. He was the loyal president of a unique mutual benefit association of the men, and he zealously worked to promote their best interests. Perhaps some of his official associates thought that Mr. Richardson's sympathy for the employees extended too far, but he thoroughly believed that earnest effort for the welfare of the employees was the part of wisdom as well as of duty. His memory will be cherished by these men in whose interest he was so deeply concerned. Mr. Richardson was a genial, kindly, companionable man, and his presence will be greatly missed, both in the gatherings of street railway men, where he was so prominent a figure, and in the social circles of the city in which he has resided for so many years.

The Boston Rapid Transit Subway.

A suit has been brought by eighteen taxpayers of Boston to restrain the Rapid Transit Commission from continuing the construction of the subway. The action is brought against the members of the commission and the city treasurer of Boston. It is alleged that the act of 1894 authorizing the construction of the subway is in violation of the property rights of the residents of Boston. They claim that the act provides no compensation to the city itself or to individual real estate owners whose property rights are to be taken under the act. They also allege that the act provides for the acceptance of its terms by a majority of the voters at a special election or at a general election. If the transit commissioners are allowed to proceed with the construction, they say, it will involve the city in an indebtedness or a liability of many millions in excess of the limit prescribed by the laws of the state. The commissioners, it is claimed, procured from the city treasurer an issue of $1,000,000 of bonds, and thus incurred a current debt for that sum, which is to be paid by the taxation of the plaintiffs; and further, that if the commissioners are not restrained they may apply for more bonds without authority having been conferred upon them for that purpose. It is alleged that some of the plaintiffs are occupants of stores on those streets under which the subway is to be constructed, and that the commissioners, through their agents, intend to enter upon their premises and interfere with their business.

It is also claimed that the present invasion of the Common and the Public Garden is not warranted by law; and further, that the subway is not for the use of the public in any legal sense. They pray that a decree may issue, declaring that the act of 1894, so far as it relates to the subway and the construction of it by the issue of bonds, is invalid; that the commissioners have no authority to proceed with the work; that the issue of bonds by the city is unwarranted; that the city treasurer is not lawfully empowered by the act to issue bonds for the city; that the bonds already issued are invalid; and that the defendants be ordered to desist from the work of building the subway.

The Successor of the Railway.

The fact that several steam railroad companies have decided to install at once electric railway systems on branch lines has caused an extraordinary amount of discussion of the significance of the change. It is argued that this is the beginning of the end; that the substitution of electricity on the branch lines will lead to the ultimate abandonment of steam locomotives. In the last number of the *Popular Science Monthly*, Appleton Morgan treats of this subject somewhat at length. In the course of the article he says:

Our nineteenth century has been the railway age. Within its bounds the railway has been entirely conceived, invented, utilized, and perfected. But will the century which has been the birth and genesis of the railway witness also its exodus and its death? Perhaps not; and yet—perhaps. It has been anticipated and foreseen that electricity was to be the successor of steam, and experimental electric locomotives have already been operated with more or less satisfactory results. But the question appears at this moment to be not whether the electric locomotive will supersede the steam locomotive, but whether locomotives themselves are not to be dispensed with, and tossed, together with drawings, models, plans, specifications, and estimates for a substitution of power, upon the scrap heap, while the substitution shall be, not of the motive power, but of the motor.

It looks, indeed, as if the next century, whatever it may have in the way of aerial flight in store for us, will have no difficulty, if it desires the honor, of being christened "the trolley age." For it is to this new traction system that the railway companies are already looking with that apprehension with which an heirless landed proprietor regards his hostile next to kin. Loaded down with their vast burden of fixed charges and costly maintenance, crippled by all sorts of parasites, legal, illegal, and mixed, there seems to be nothing for them to do but to wait patiently to be superseded.

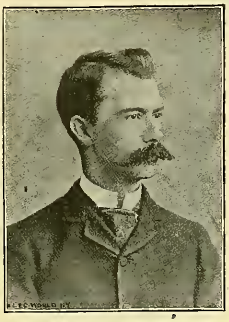
For many years the railway companies had come to philosophize helplessly at the prospective diminution of suburban profits from the horse or dummy-operated tramway, and had missed the out-of-town patron who had begun to turn his back upon comfortable sittings and smokers, sumptuous saloons, luxurious upholstery, facilities for his traveling whist or chess, heat, water, and conveniences galore. They had without a murmur seen all these pale in attraction to the man of business, who needed not to await time tables or succumb to belated or missed trains, when the buzzing little trolley hummed along its inexpensive wires every five minutes, so long as it afforded him a board bench or a strap to hang on by. But when this unexpected trolley began to go farther and stretch its transportation powers to longer distances, the poor handicapped railways were led to look at their books and—if metaphors may be mixed—to button up their pockets and hint of receivers instead of dividends. And just at present they may be praying for time to turn around before a transcontinental trolley is upon them.

The trolley indeed has, in less space of time than that required to launch any other known improvement, practically captured the cheap transportation field. This newcomer, indeed, seems equipped with every opportunity that the railways have been coveting for 50 years, and to be getting for the asking everything for which the railways have to pay the heaviest. Its economies began at its very birth. In its construction it has no use for high-salaried engineering and locating parties; for woodsmen, excavators, dumpers, agents of rights of way, and for the long catalogue of machinery for surveying and making a railway line. All these become as superfluous and as clumsy as the Old Man of the Sea on Sinbad's back; for, while your principal assistants are putting on their rubber boots, your trolley—built in a night, like Aladdin's palace—is earning dividends, oblivious of summits or watersheds or grades, loops or bridges, trusses or cantilevers. It is only an item of the situation that, as fast as charters can be mobilized or capital adjusted or plants converted, the dummies are side-tracked, horses led to auction, while every species of tramway spins its overhead wires and becomes trolleyized into remunerative investments. We sometimes smile at the non-perspiring Philadelphian pace; but here are in evidence, from the calm City of Brotherly Love, figures of a month's operation of a single line where the trolley has just replaced the horse, to wit: Four hundred and fifty horses that were formerly used on the road consumed in a month ninety-two and a half tons of cut hay, about eight thousand pounds of feed, and two tons of straw. This, with shoeing, cost the company about four thousand five hundred dollars. Offsetting this, the coal consumed in one month's working cost five hundred and eighty-five dollars, a clear saving by the trolley of three thousand nine hundred and fifteen dollars. On an average, eighty men were employed around the stables and in the car sheds for looking after these four hundred and fifty horses. For these the company substitutes two or three electrical operatives, and saves about five thousand dollars a month in expenses, and anticipates an increase besides of twenty-five per cent. on receipts by the increase of business, by the saving of time and the doubling of train schedules.

To sum it all up, there has suddenly and silently burst upon us an enormous economic agent, and one which, by cheapening the facilities not only of capitalists and manufacturers, but of the least and poorest of consumers, is actually and practically solving those social and agrarian problems which within a few years had threatened serious upheaval in the body politic. With the trolley competing in the field against the railway (selected by the communist as the solid and material symbol of arbitrary power which he should burn and delapidate and destroy, to assert his popular rights), who shall say that a relief has not come; who shall say but that the railway, with diminished dividends and a divided patronage indeed, may have received from an unexpected quarter immunity from the peril-destroying forces and the hostility of the masses, and at last enjoy its meagre surplus of profits over fixed charges, pay roll and maintenance disbursements, in something like peace! Meanwhile the people have been passed from the tender mercies of the larger to those of the smaller capitalists —from the reign of King Log, as it were, to the reign of King Stork. Whether a time will come when our paternal Government will be urged to seize the trolleys and license every one who would operate his own conveyances upon them, remains to be seen. Possibly to the railway-haters the advent of the trolley has come both as a revelation and an extinguisher! At any rate it has brought them the cheap transportation for which they worried, without the expense of building their own railway coaches, and so a revelation in solving their difficulties with unexpected rapidity. But has it also silenced them? They can not demand that Government seize the railways without seizing the tramways. But have they been emancipated, or only had their masters changed?

A Question of Legal Tender.

Ex-Judge Armstrong, formerly president of the National Electric Light Association, recently appeared for the defense in an interesting suit brought against the Camden, N. J., Horse Railway Company. The action was instituted by Walter M. Wood, who demanded $500 damages because he had been ejected from one of the company's cars when the conductor was unable to change a $5 bill tendered to him by the plaintiff. On the trial of the case Judge Armstrong questioned the plaintiff regarding the character of the bill, but the latter could give no specific information. The court then granted a non-suit on the ground that the plaintiff must of necessity prove that he had offered legal tender.


Judge E. A. Armstrong.

Arrest of a Chicago Street Railway Claim Agent.

A few months ago the officials of the West Chicago Street Railway Company made the startling discovery that legal papers of the utmost value had been stolen from the company's vaults. Suspicion was directed toward an employee who had formerly been connected with the claim department. Detectives were put upon his track and the suspected man, William A. Horshor, was taken into custody last week. The missing papers were recovered and a confession was obtained from the guilty man. The story is an interesting one. Horshor was discharged from the company's service in October last because it was strongly suspected that his wife was soliciting prosecutions of personal damage cases against the company, presumably on behalf of Chicago lawyers. The company deemed it to be to its decided disadvantage to allow any one of its employees or members of their families to engage in or encourage business of this sort, and Horshor's services were dispensed with. Before he left, however, he decided to help himself to the records in a number of personal damage cases that had been brought against the company.

He opened an office under the name of the Northwestern Accident Adjustment Company and commenced to dispose of the records he had abstracted. He entered into correspondence with a number of lawyers in Chicago, offering to obtain for them evidence which would be of the utmost value in the prosecution of cases against the West Chicago Street Railway Company, in which they had been retained. It was due to his persistence and boldness in offering to dispose of evidence in this way that led to Horshor's arrest. After he had been taken into custody, the missing papers were found in his office. Correspondence was also discovered which seemed to make the case against him complete. The papers consisted of outlines of testimony, briefs, pleas, names of witnesses and other matters of that sort and they were of such importance to the company that it would have been almost helpless in defending several suits.

Comments and Views of Contemporaries.

Qualities of a Good Fender.—We should say that the successful safety appliance for use until the present cars are discarded should be, first of all, not a murderous fender. It should pick up persons, large or small, whom it might encounter prone on the track and should trip persons overtaken on foot so that they would fall on top of the safety appliance and not beneath it. It should carry along, not necessarily on a feather bed, until the car could be stopped, such persons as it might pick up or trip up, or should dump them aside out of the way of the body or truck of the car. It should protect them from mangling by the projections beneath the platforms, as well as from death under the wheels. It should do this on any track smooth enough for cars to be run regularly over it, and with any possible distribution of the load in the car. It should be easily applied to any car, so that the companies would not be subjected to the cost and the public to the delay of traffic consequent upon laying up cars for a considerable period for alterations necessary before attaching the safety device. It should be reasonably cheap. We believe that devices which should meet these requirements would be welcomed by the trolley and cable companies, and would be adopted without unnecessary delay. It is not too much to hope that they will be forthcoming before long, and it would be better to wait for them a little longer than to force the companies to substitute other murderous fenders for those now in use.—*New York Sun.*

Fender Question.—The various fenders in use and the multitude in the Patent Office that will never be used, indicate that most of the inventors have no conception of the difference between a trolley car gliding slowly on a perfect track and a trolley car rocking along at the top limit of speed over the average track of Brooklyn, for instance. There are many fenders that under the first-named conditions would seat a careless citizen so comfortably in their luxurious meshes that it would seem a pity that their inventors had not added the necessary appliances for handing him a morning paper and putting a lighted cigar in his mouth ; yet these same fenders in actual use would knock down the citizen, hold him down despite his struggle for life, bruise and disable him, and, when he was no longer able to resist, would pass him along for the drawbar, brake rods, wheel guards, wheels, and power box to complete the job. The managers of the companies do not want any more of these fenders.—*New York Sun.*

A Criticised Rule.—There is, however, one rule which certainly precludes perfection of transportation by the West End Street Railway Company. From a public point of view, it is the most notable flaw or setback in what is conceded everywhere to be otherwise one of the most admirable systems of city railway in this country. * * * This boomerang rule of the company, in colloquial language, is and requires that every motorman or car driver and every conductor must stop to take on passengers whenever they signal from a "white post" or station along the company's tracks. The glaring absurdity of this rule is, of course, that a car so signalled must stop, no matter how crowded it may be. And the really farcical aspect of the rule is that cars stop to take on "freight" when there is n't enough room to furnish a foothold for, one might almost say, a mouse.—*Boston Standard.*

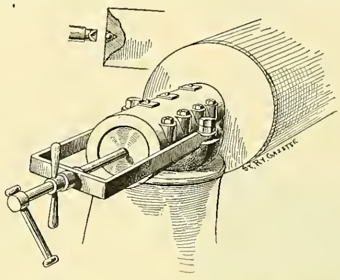
Competition with Steam Lines.—It is just as well to recognize that this new form of competition has come to stay. The electric line is a cheap and popular method of transit. Its frequent stoppages, its ability to take people up and set them down where it pleases, its ability to run past the householder's door, and above all, its cheap rates are powerful advantages and irresistible arguments. For short distances, and especially between minor centres that lie only a few miles apart, it is decreed to be the medium of communication of the future. The true policy of the steam roads would seem to be to cease interfering with the growth of a popular convenience which they cannot bar out, and to conform their own arrangements as nearly as may be to the new order or things.—*St. Paul Pioneer Press.*

Trolley Freight Lines.—Trolley freight lines are in the near future. They must surely supersede steam for hauling such products as tobacco, sugar cane, sawlogs, ores, coal, and so on, for short distances. It is, in many respects, the ideal motor for assembling the materials of manufacture, where they do not lie too far apart. It has many advantages over steam traction. The trolley car won't set a wheat field or load of cotton on fire. It is a far cheaper power than either steam or horse energy. It will be introduced along lines here indicated rapidly, once a few pioneers shall blaze the way.—*Chattanooga Times.*

Electric Lines Needed.—A Connecticut railway company petitions the legislature to prohibit the construction of electric railways between towns now connected by steam lines. This is much the same as though the vessel men were to ask the prohibition of railroads between river points now connected by steamboat lines. The fact that such a petition has been presented shows that the competition between the electric and the steam lines is becoming serious and is sure to become more so.—*Cincinnati Times-Star.*

Device For Turning Armatures.

The simple little device shown in the illustration was designed to overcome a practical, though a small difficulty encountered in turning commutators. The lateral play of the armatures in the bearings is sufficient so that it is difficult to turn down the outside edge or to reach with the tool the corner at the shoulder. The device consists of a rectangular frame, 14 inches in length, made of two-inch wrought iron, having eyes formed at the ends. It is attached by the eyes to the generator by means of bolts which secure the journal bearings to the pedestal. A screw which has a lock-nut is provided, having at the end a tapering hole bored of the same diameter as the center hole in the end of the armature shaft. A steel ball $\frac{5}{8}$-inch in diameter is placed where the two taper holes in the armature and screw come together. When a commutator is to be turned down, the wrought iron frame is bolted to the pedestal, and the screw is tightened. This forces the armature shaft against the bearing and prevents lateral movement.



Device for Turning Armatures.

The ball-bearing between the meeting ends of the screw and the armature shaft at the same time eliminates friction at that point. The device was designed by A. K. Bonta, electrical engineer of the North Hudson County Railway, of Hoboken, N. J.

Safety Trolley Wire Support.

The safety wire-support shown in the accompanying cut was designed to provide a more simple mechanism than is now employed for cutting the current off from a section in case a wire breaks. The device was recently patented by A. D. Poole, of Boston. It consists of two plates of conducting material, of the form shown in the illustrations, one of which is provided with a stud projecting into an opening formed in the other plate. A bar of conducting material secured between the plates by bolts or rivets has at its upper end an aperture in which is the usual bell for holding up the wire hanger and its support. Two pieces of conducting material are secured between the ends of the plates having on their inner surfaces circular recesses designed to furnish bearings for the pivoted arms to which the trolley wire is attached. The inner ends of the arms, when in position to complete the circuit, are close to an enlarged section of the central bar, so that a practically continuous support for the trolley wire is afforded. Circular blocks of insulating material are mounted in the bearings and are so

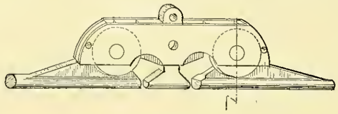


Fig. 1.

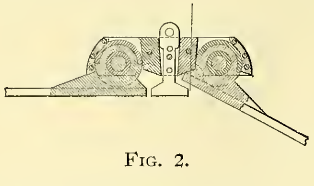


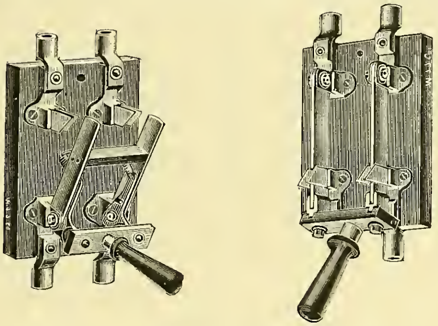
Fig. 2.

arranged that the frame or plates are insulated from each other except when the other wire is intact and the circuit is closed. Should the wire attached to either of the arms become broken, the arm to which the broken wire is attached will drop by gravity and the inner end of the latter will come into contact with the insulating material, thus breaking the circuit and rendering the wire dead.

Some New Station Switches.

The Fiberite Company, of Mechanicville, N. Y., manufacturer of the well-known Medbery insulation and overhead trolley equipment, is putting upon the market a line of switches made up of aluminium bronze, which are claimed to be fully equal, if not superior, to anything now in use. The switches are constructed in a substantial manner, well finished, and mounted on polished black slate, and have ample contacts.

The quick break switch shown in Fig. 1 is constructed so as to make it impossible for the blades to linger on the edge of the contact jaws. A slight depression of the handle puts two powerful springs under a tension, which is maintained until the blades are, by a further movement of the handle, nearly disengaged from the contact jaws, when the tension of the springs causes the blades to fly out with an instantaneous, sudden break. The two inner levers to which the yoke and handle are rigidly fastened move independently upon the inner ends of the pivots, thus making it possible to tighten or loosen the contact spring without having it interfere with the easy working of the contact levers.


Figs. 1 and 2.—New Station Switches.

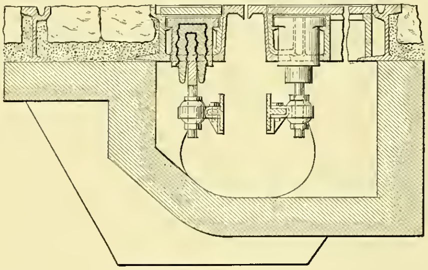
Another feature is the practical device for fastening the guide yoke to the blades. This has, in switches of older date, been done by threading the hole in the yoke, but as this yoke generally consists of a piece of fibre, considerable annoyance has been experienced from the stripping of threads, resulting in the loosening and twisting of the yoke, and a consequent flashing, due to the blades not leaving the contact pieces in unison. To obviate this defect, a piece of metal, provided with two threaded holes, has been inserted in the fibre, making a good substantial device. These metal pieces, with their extended lower ends, also serve to hold the lower ends of the springs.

The plain jaw switch, shown in Fig. 2, also possesses some notable features. The old way of attaching the yoke to the blades has been improved upon by putting a tenon on each blade, which fits closely into a mortise in the yoke, thus obviating any twisting of the blades or getting out of alignment. Each contact jaw is secured to the base by two screws so as to avoid turning on the slate, which is a common occurrence when only one screw or bolt is employed. The connection lugs are located at the extreme ends of the switch, doing away with the necessity for carrying unsightly wires over the base. Every switch turned out is guaranteed to be capable of carrying 50 per cent. above its rated capacity, and only first-class workmanship and material are allowed to enter into the construction of these goods.

Electric Railway Conduit System.

The electric railway conduit system, illustrated in cross section in the accompanying cut, was designed by A. N. Connett, Chief Engineer of the Metropolitan Railway Company, of Washington, D. C. Improved means for securing the insulated supports which carry the conductor supports in the conduit are provided, and at the same time easy access to the insulator and the supports to facilitate making repairs is afforded.

In the illustration one of the insulators is shown in cross section and the other in side view in the seat or chamber. The conduit does not differ from the ordinary construction. It has slot rails and supporting frames, which are cast integral with the manhole frames and are formed with interior flanges to sustain the engaging flanges of the improved insulated supports. On the laterally projecting flanges of the slot rails are supporting frames, forming a chamber with sockets to support the interior flanges of the outer casing of the conductor supports. The latter comprise an outer shell formed with an exterior flange, the shell extending downward, and the lower end provided with an upward incline, which is designed to prevent the drop of moisture from reaching the insulators. An interior non-conducting holder is secured to the outer shell, being constructed with an enlarged annular recess at the lower portion, to avoid contact with the stem to which the conductors are connected, and by which they are carried. The insulated holders extending below the outer shell have their lower ends beveled, to further protect the stem and insulators from water, which, through an accident, might find its way in. The stems of the insulated holders consist of three threaded bolts, on which brackets carrying the conductors are secured.


Section of Conduit.

Any form of conductor may be used in connection with these insulated supports, provided they have the means for engaging the stems of the holders. As the cut shows, the outer shells are detachably sealed in the frames, and by detaching the brackets, the holders may be lifted from their seats when repairs or adjustments are required.

FINANCIAL NOTES.

EARNINGS OF GLEN FALLS ROAD.—The quarterly report of the Glens Falls, (N. Y.) Sandy Hill & Fort Edward Street Railway Company shows: Gross earnings, $10,008; operating expenses, $8,610; fixed charges, $2,393; net loss, $925.

RECEIVER IN SAVANNAH.—On the application of J. W. McReynolds of Tennessee, a receiver has been appointed for the City & Suburban Railroad Company, of Savannah, Ga. Most of the stock is owned by George Parsons, of New York.

EX-GOVERNOR FLOWER ON LONG ISLAND TRACTION.—Ex-Governor Flower of late has been booming the stock of the Long Island Traction Company of Brooklyn. He has accepted a position on the reorganization committee and states that he has the greatest faith in the property.

INCREASED CAPITAL STOCK.—The New York State Railroad Commissioners have granted the application of the Herkimer, Mohawk, Ilion & Frankfort Street Railway Company for permission to increase its capital stock from $55,000 to $150,000, the increase to be used for purposes of electrical equipment.

BROOKLYN INJUNCTION SUIT.—Michael Murphy has procured from the Supreme Court a temporary injunction, restraining the Brooklyn Elevated Company from constructing its loop in front of the plaintiff's premises, on High street and Liberty. He alleges that before the building of the road was begun his property was worth $150,000, and that its construction will materially lessen its value.

LAKE STREET L. LITIGATION.—William Ziegler, a stockholder of the Lake Street Elevated Railroad, Chicago, who filed a bill for a receiver of the road in the United States Circuit Court recently, has been granted permission by Judge Showalter to amend his bill. The original bill charges mismanagement and conspiracy against the stockholders. The amended bill amplifies the old allegations.

APPLICATION FOR RECEIVER IN ST. JOSEPH, MO.—On April 19, Francis Hyde, vice-president of the Central Trust Company of New York, filed papers in the United States District Court in St. Joseph, Mo., in a suit asking that a receiver be appointed for the St. Joseph Lighting and Traction Company. This includes the electric railways and lighting plant. It is alleged three payments of interest have been defaulted. The indebtedness is placed at $1,750,000.

PROPOSED LEASE OF PHILADELPHIA ROADS. The directors of the Hestonville, Mantua, & Fairmount Passenger Railway Company of Philadelphia, have decided that it would be advantageous to purchase the Fairmount Park & Haddington Passenger Railway Company, and a special meeting of the stockholders of the Hestonville Company has been called for May 6, for the purpose of voting for or against the proposed lease. As the controlling interests of both companies are the same, nothing stands in the way of the proposed deal. The term of the proposed lease will be 999 years, and a fixed rental of six per cent. per year on the capital stock will be paid.

CLAIMS AGAINST NEW YORK ROADS. Controller Fitch claims that the Broadway Railroad Company owes the city $105,348.20 for percentages on receipts, and for car licenses. The company is willing to pay $66,197 27 of this sum for percentages and license fees due for 1894, and $3,325 for car license fees for 1888 and 1889. The payment of $26,609, demanded for operating the cable road from June to September 30, 1893, is refused on the ground that the cable road was not complete at that time. The company also disputes the payment of $7,923.11 for percentages in 1891, because the Broadway and Seventh avenue cars were being run over other lines at that time, while the cable was being put in Broadway. The Third Avenue Company obtained its privileges through the legislature, and not through the Board of Aldermen. No mention having been made of percentages in their franchise they now refuse to pay any. The case will be taken to court.

NEW INCORPORATIONS.

VENICE, Ill.—The Venice, Madison & Granite City Railway Company has been incorporated with a capital stock of $60,000. The promoters are C. H. Sharman, Fred. E. Allen, and E. J. Spencer.

HOBART, IND.—Hobart & Western Electric Railway Company has been incorporated with a capital stock of $50,000. The promoters are Alfred Morrison Andrew I. Smith, Geo. Stoker, and Seward Lightner.

WEST CHESTER, Pa.—The Wayne & Conshohocken Street Railway Company has been incorporated with a capital stock of $30 000. The promoters are Francis Fenimore, St. Davids; R. H. Johnson, Wayne; and Julius A. Bailey, Wayne, Pa.

WADSWORTH, O.—The Wadsworth Electric Railway Company has been incorporated. The capital stock is $10,000 and the promoters are F. G., McCauley, W. A. Ault, O. V. Dibble, R. F. Weaver, Frank Mills,, and W. S. Holloway.

THE CHICAGO SUBWAY, ARCADE AND TRACTION COMPANY has been incorporated with a capital stock of $15,000,000, for the purpose of constructing subways in that city and operating a line of cars. The secretary of the company can be addressed.

WESTCHESTER, N Y.—The Westchester and Williamsbridge Traction Company, has been incorporated to operate a street surface electric road between the villages of Westchester and Williamsbridge; capital, $60,000, and directors C. P. Morgan, A. G. MacDonnell and Charles F. Tracy, of New York City.

THE DENISON STREET AND ELECTRIC RAILWAY COMPANY, Denison, Tex., capital stock $50,000, has been incorporated to construct and operate street railways or belt lines of railway in or near Denison, etc. The promoters are A. F. Platter, G. McLoger, P. H. Robin, T. Murphy, and E. H. Lingo, of Denison, Tex.

THE ATLANTIC COAST ELECTRIC RAILWAY, Asbury Park, N. J., capital stock $1,000,000, has been formed to construct and operate a street railway or traction company. Wm. H. Hurst, 238 Central Park, West; John J. Walsh, 6 East 93d street, and Henry Haggerty, 137 East 71st street, all of New York, are the interested parties.

LAKE CHARLES, LA.—The Lake Charles Railway Company has been organized with a capital stock of $100,000, for the purpose of building a road at this place. The work of construction will be commenced within six months. G. A. Jahn, of New York, is president, R. H. Mason, of Lake Charles, vice-president, and H. B. Milligan, secretary.

JACKSONVILLE, FLA.—A bill has been introduced providing for the incorporation of the Jacksonville & Tampa Bay Railway Company, capital stock $2,000,000. It is proposed to build an electric railway between the points named via Sanford and Kissimmee City. C. C. Thompson, M. Dodge and T J. Appleyard are among the incorporators.

WILLIAMSPORT, PA —A charter has been granted for the construction of a trolley line to connect the boroughs of Muncy, Hughesville and Picture Rocks, a distance of nine miles. The incorporators are from Schuylkill County, State Senator John J. Coyle, Congressman Charles N. Brumm, Patrick Campion and C. O. Smith. Work on the new road will begin at once.

PROVIDENCE, R. I.—The Inter-State Consolidated Street Railway Company has been organized. The board of directors consists of Marsden J. Perry, Providence; Henry R. Barker, Providence; Lyman B. Goff, Pawtucket; and Clarence L. Watson, Attleboro; Henry F. Barrows, North Attleboro; Edward R. Price of North Attleboro. The officers are: Marsden J. Perry, Providence, president, and Edward R. Price of North Attleboro, treasurer and secretary.

NEWS OF THE WEEK.

BURLINGTON, VT.—An electric road is being built from Winooski to Essex Junction.

MONROE, MICH.—Mr. Fenlon of Findlay, O., has applied for a street railway franchise.

ROSSVILLE, TENN.—An electric railway line is to be built from Rossville to Chickamauga Park.

DENISON, Tex.—Steps are being taken to establish an electric railway. P. H. Tobin and A. F. Platter are interested.

KANSAS CITY, MO.—The steam road from this city to Independence is to be equipped with the electric trolley system.

NEW HAVEN, CONN.—A line is to be built from this place to Hamden Plains Church. Address the clerk of the Council for details.

MORRISTOWN, N. J.—Permission has been granted the Morristown Electric Company to erect poles and string wires on Hill street.

COLUMBIA, PA.—Work will be commenced in the near future on the construction of the Columbia, Mt. Joy & Ironville Railway.

HAGERSTOWN, MD —The construction of an electric street railway in this city is contemplated. Address Mayor Keedy for further information.

CHATTANOOGA, TENN.—The construction of a railway from this city to Augusta, Ga., is projected. C. W. Howard is among those interested.

ST. LOUIS, MO.—The King's Highway Railway Company has secured a charter to build an electric line along the thoroughfare of that name.

REMINGTON, PA.—It is reported that the People's Electric Street Railway Company, of Pittsburgh, will extend its line from Freedom to this place.

BARRINGTON, R. I.—A charter has been applied for by the Barrington & Warren Railway Company, to construct a line between the points named.

NEW YORK.—It is reported that the New York & Greenwood Lake Railway is to be operated by electricity. Abram S. Hewitt can be addressed for details.

WILLIAMSTOWN, MASS.—Right of way has been applied for by the Hoosick Valley Street Railway Company to extend its line from North Adams to this place.

BROWNSVILLE, N. Y —A franchise has been granted by the village authorities for the proposed extension of the electric railway. Address the village clerk.

HOUSTON, TEX.—O. M. Carter may be addressed regarding the extension of the Houston Rapid Transit Company's trolley system to the race course in the suburbs.

EASTLAKE, LA.—It is reported that the new electric street car line will be extended to connect with the Bradley-Ramsay tram road several miles north of the city.

ATHENS, GA.—The Athens Street Railway Company has purchased the Mitchell's bridge property, and will convert its magnificent water power into electricity.

GREENBUSH, N. Y.—The Electric Railway Company has applied for a franchise to construct an electric railway. A. Barnes is at the head of the enterprise.

FLUSHING, L. I., N. Y.—The Newtown Railway Company has applied for a franchise to construct its line over Flushing Bridge, and through certain streets of this town.

PITTSBURGH, PA.—The Oliver Iron & Steel Company will build an electric railway on Bingham street. For further particulars address the secretary of the company.

ALBANY, N. Y.—Plans have been prepared for the enlargement of the power house of the Albany Railway, to cost $500,000. A 1,000-hp boiler and generator will be installed.

SANFORD, FLA.—J. M. Saunders and others have been granted a franchise to build and maintain an electric street railway; it also allows the privilege of lighting by electricity.

LOCKPORT, N. Y.—Charles A. Johnson, of New York City, has been granted a franchise to extend the Lock City Electric Railway. The secretary can be addressed for particulars.

HACKENSACK, N. J.—The Bergen Turnpike Company has applied for right of way for its proposed trolley line through this place. James J. Romeyn can be addressed for particulars.

POINT PLEASANT, N. J.—The South Jersey Street Railway Company intends building to Bay Head from Point Pleasant, and will have its extension ready for operation by June 1.

BUCYRUS O.—The county commissioners have granted a franchise to the Inland Electric Railroad Company to construct and operate a road between Bucyrus and Sulphur Springs.

ROCHESTER, N. Y.—The Rochester Railway Company has applied for a franchise to extend its line. The general manager of the company can be addressed for detailed information.

BROOKLYN L. TRAVEL.—It is announced by the Secretary of the Brooklyn Elevated Railroad Company that the average travel on the system to-day is 10,000 passengers more than a year ago.

WASHINGTON, D. C.—The Washington, Alexandria & Mt. Vernon Electric Railway Company has petitioned to complete its line in this city. Ex-Mayor Strauss, of Alexandria, is interested.

TOLEDO, O.—It is reported that a company is being organized for the purpose of constructing an electric road from this city to Sylvania. Address the clerk of the Council for information.

MT. MORRIS, N.Y.—Surveys have been made by the B.R. & P. Railway for the extension of the Silver Lake Railway to this place. The secretary of the road can be addressed for detailed information.

BROOKLYN, N. Y.—A new trolley fender, invented by J. A. Astruck, of New York, was tested by the Atlantic Avenue Railroad Company this week and seemed to meet the conditions very successfully.

THE DENVER CONSOLIDATED TRACTION COMPANY, controlling nearly all the electric lines in Denver, Col., reduced the wages of its conductors and motormen yesterday, April 26, to 20 cents an hour.

WAUKEGAN, ILL.—A franchise for an electric street railway line has been granted by the City Council Monday night to the Bluff City Electric Railway Company, a local line. The company has accepted it.

POTTSVILLE, PA.—The Town Council has granted the Schuylkill Electric Railway Company an extension of time in which to complete its road. R. H. Verner, town clerk, can be addressed for detailed information.

AUBURN, N. Y.—The Auburn City Railway Company has applied for permission to construct, operate and maintain an electric street railway on certain streets of this city. Orlando Lewis is interested, and can be addressed.

FORT WORTH, TEX.—It is reported the Dallas & Oak Cliff Electric Railway Company, will extend its road from Dallas to this place as soon as right of way can be secured. Henry C. Scott is president and A. P. West, secretary.

KINGSTON, N. Y.—The Rondout & Eddyville Railway Company has applied for permission to construct, operate and maintain an electric railway through this city. City clerk August Schepmes can be addressed for further information.

DANVILLE, PA.—The construction of an electric railway at this place is contemplated by the North Susquehanna Transit Company. A franchise has been applied for, and the secretary of the company can be addressed for detailed information.

MUNCY, PA.—A company has been organized for the purpose of building a trolley line, nine miles in length, between this place, Hughesville and Picture Rocks. Senator John J. Coyle and Congressman Charles M. Drummare are among the incorporators.

WEYMOUTH, MASS.—The Braintree and Weymouth Street Railway, the connecting link between Weymouth and Brockton, was formerly opened on April 18, between Weymouth Centre and Braintree. The citizens of Weymouth made the occasion a gala day.

BEAVER FALLS, PA.—Funkhouser & Coates have been awarded the contract for important improvements on the line of the Beaver Valley Traction Company. The company is substituting 25 horse power motors for its 15 horse power motors and will hereafter draw trailers.

TERRE HAUTE, IND.—It is reported that the Crawford Coal Company of this place will prepare plans for the construction of a railway, 60 miles in length, in Fentress County, Tenn., to connect with the Cincinnati Southern system. The estimated cost is $1,000,000.

CHICAGO, ILL.—Four hundred laborers in the employ of Clift, Wise & Co., contractors, laying tracks for the Chicago City Railway Company in Archer and Ashland avenues, struck last week for an increase of 25 cents over their pay of $1.25 a day. The contractors yielded, and the men went back to work.

SOUTH BRAINTREE, MASS.—The pulley on the main driving shaft in the power station of the Braintree, Randolph & Holbrook Electric Street Railway broke on April 22, and as a result that road and the Weymouth and Braintree line were tied up. An employee was struck by the belt and was seriously hurt.

RYE, N. Y.—The New York, Westchester & Connecticut Traction Company has applied for a charter to construct, maintain and operate an electric road between the points named. Right of way through this town has been also applied for. Charles Brennecke, Commissioner of Highways, can be addressed for further information.

GRAFTON, W. VA.—The deal for the lands and right of way needed by the Grafton Electric Railway Company for its line from Grafton to Pruntytown, W. Va., 20 miles north, was closed to-day, and construction will soon begin. The company is composed of New Yorkers, who own large tracts of coal land near Pruntytown, and the road will haul coal and freight as well as passengers.

NEW BRITAIN, CONN.—Work on the electric line has commenced. At a meeting the directors of the Consolidated Company were made nine in number. They are J. H. Sessions, J. H. Ward, O. F. Strunz, W. S. Ingraham, C. S. Treadway, N. E. Pierce, A. J. Muzzy and C. H. Calor. It is understood that J. H. Sessions will be chosen president of the Consolidated Company. O. F. Strunz has been appointed general superintendent.

SOMERVILLE, N. J.—Work on the line of the New York and Philadelphia Traction Company between Somerville and Bound Brook was stopped last week by legal proceedings instituted by the Central Railroad of New Jersey. A writ of certiorari was served on the traction. This writ, which calls for the review of the grant of right of way through the town by the Board of Commissioners, is returnable on June 10, and no work can be done until a decision is given.

PORT CHESTER, N. Y.—The New York, Westchester and Connecticut Traction Company has filed with the Secretary of the State in Albany an extension of route, as follows: Beginning at Boston Post Road, in the village of Port Chester, along Pearl street to Factory place to Irving avenue, to Broad street, to King street, to Willett street, to Terrace avenue to the junction of the same with the Boston Post Road. Also along the following streets: Beginning at the junction of the Boston Post Road and Willett avenue, along Willett avenue to King street, thence connected with the main tracks of the company.

PORTLAND, ME.—A project known as the Ossipee Valley Railroad is under consideration. As planned the road will start at the railroad station in Cornish and extend through Cornish and Parsonsfield in York County and thence through Hiram and Porter in Oxford County to Porter village. It is argued that it must prove of great benefit to the towns along the valley of the Ossipee not only by bringing them into direct connection with the larger centres of traffic, but also opening them up to the invasion of summer visitors. It will be used for both freight and passenger traffic, but the former will perhaps be its chief source of revenue. The towns of Cornish and Parsonsfield and the other towns lying close to them are among the richest and most fertile in the State, and the yearly total of their manufactures, including woolen goods, lumber, canned corn, and evaporated apples, is very considerable. The road will afford an outlet for all these products, both of the farm and the factory, and cannot fail to be of immense benefit to the Ossipee valley towns. The projectors of the road are J. D. Merrill, Parsonsfield; Wm. D Churchill, Cornish; Elisher S. Wadleigh, Parsonsfield; Edward H. Bert, Boston; and Clark E. Varney, Somersville.

TRADE NOTES.

THE BERLIN IRON BRIDGE COMPANY, of East Berlin, Conn., is building an extension to the casting shop of the Waterbury Brass Company, at Waterbury, Conn. The new foundry which the Jackson & Woodin Manufacturing Company is now building at Berwick, Penn., was designed by the Berlin Iron Bridge Company

THE ANCHOR ELECTRIC COMPANY, of 71 Federal street, Boston, Mass., has just issued a new catalogue devoted to railway supplies. It is a neat little pamphlet so arranged that it may be conveniently referred to and not large enough in size to be cumbersome. It is thoroughly illustrated and contains matter of timely interest.

THE C. W. HUNT COMPANY, of 45 Broadway, New York, are installing in various kinds of plants a vast amount of machinery for handling and transferring material of all kinds, which is giving great satisfaction. We notice that the Ahrens & Ott Manufacturing Company, of Louisville, Ky., have recently installed a system of overhead trolleys, manufactured by the C. W. Hunt Company, for handling their materials.

THE COMPOSITE BRAKE SHOE COMPANY, of Boston, seems to have been especially successful in its solution of the brake shoe problem. A proper brake shoe should have a strong and steady hold upon the wheel in motion and gradually, but effectively, retard it. At the same time it should not produce destructive wear upon the wheel, nor be itself worn away too rapidly for practical use. The result was obtained by the Composite Brake Shoe Company, not in a single substance, but in the use of what may be called a compound substance. A metal brake shoe is formed with numerous sockets suitably beveled, into which are put wooden plugs cut across the grain. The latter are held by means of a locking device which secures them against becoming loose.

THE STANDARD PAINT COMPANY, 2 Liberty street, New York, is selling increasing amounts of its P. & B. insulating compounds, armature varnish, and P & B tape to street railway companies. The company states that its street railway business is particularly gratifying, as the companies which used its goods are more than ready to acknowledge their good qualities. A well-known electrician of one of the large Southern electric roads recently wrote to the company asking for a supply of genuine P. & B. He stated that he had been troubled for a year by the fact that supply houses had been furnishing him with materials said to be as good as P. & B., but which proved worthless. The demand for the company's goods abroad is growing almost as rapidly as in the United States.

THE DAVIS CAR SHADE COMPANY, of Portland, Me., manufacturers of curtains for railway cars, has recently issued a notice, stating that an injustice has been done to the company by announcements issuing from another manufacturing establishment, alleging that it is infringing a patent for a pinch handle for car curtains. The Davis Company states that the Commissioner of Patents has decided that the device in question is not patentable and that the patent for it was issued by the authority of subordinates in his office without his knowledge. The Davis Company has issued a notice to its customers and the trade generally offering to protect those who use its goods. It states that leading counsel have assured the company that its goods do not infringe the patents of any other manufacturer.

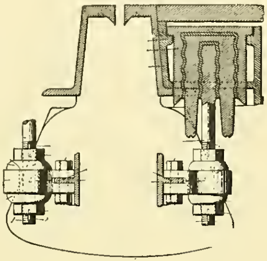
Record of Street Railway Patents.

U. S. PATENTS ISSUED APRIL 16, 1895.

537,585. CAR-BRAKE. Edward Roach, St. Louis, Mo. Filed Jan. 10, 1895. An independent bar carries each brake shoe and a threaded shaft operating any two adjacent bars in opposite directions. Is located at the side of the car adjacent to the wheels. Means are provided for maintaining the bars and brake shoes parallel with the peripheries of the wheels.

537,597. CAR-FENDER. John H. Astruck, New York, N. Y. Filed March 2, 1895. The fender has its upper rear end mounted to move vertically and a movable support is connected with the car, on which the lower front part of the fender can tilt and slide, and a spring draws the lower front part of the fender in the direction toward the car.

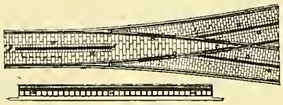
537,601. RAILWAY-SWITCH. William M. Brown, Johnstown, Pa., assignor to The Johnson Company, same place. Filed Jan. 2, 1895. This is an unbroken main line switch. A frame is attached to the main rail on its gage side and there is a pocket having a tongue which is pivoted on a horizontal axis substantially parallel with the main rail and adapted to lie against the gage line of the rail or be thrown over into the pocket, leaving the through track clear.



No. 537,6-6.

537,610. CAR-FENDER. Gottlieb Keller, West Hoboken, N. J., assignor of seventeen-twentieths to John Henry Astruck, New York, N. Y. Filed Dec. 13, 1894 The fender has its top guided to move vertically on the dash-board, wheels on the fender running on the track rails and serving to support the fender a short distance back of the front lower end. A spring draws the lower front end of the fender toward the front of the car.

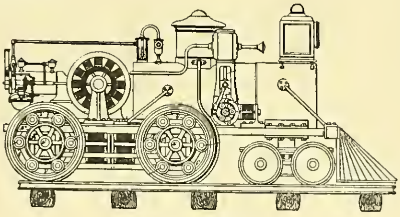
537,626. ELECTRIC-RAILWAY CONDUIT SYSTEM. Harry A. Belden, Washington, D. C. Filed Jan. 26, 1895. The conductor-support. comprises a screw-threaded support, a bracket being formed with a seat in its end face to hold the conductor and having both vertical and lateral adjustments on the screw-threaded support. Adjusting-nuts above and below the bracket adjust it vertically, and a conductor having a lateral flange is bolted to the projecting portion of the bracket. (See Illustration).



No. 537,672.

537,630. ELECTRIC RAILWAY CONDUIT SYSTEM. Albert N. Connett, Washington, D. C. Filed Jan. 26, 1895. There are opposite arranged chambers in the frames formed with interior flanges, and a conductor-supporting device comprising an outer shell is formed with an exterior flange to take on the flange in the chamber. Has its lower end edge beveled to carry the drips outward. An inner shell of non-conducting material is secured in the outer shell and extends below the same, having its lower rim extended and enlarged interiorly, to stand away from the stem which holds the conductor. A stem in the insulator supports a conductor in the conduit.

537,659. CAR-STRAP. Stephen Wilson, Philadelphia, Pa., assignor to Walter Pincus, same place. Filed Jan. 4, 1895. The car-strap or hand hold device consists of a looped flexible member freely connected with the supporting bar so as to have two depending oppositely-movable ends which constitute hand holds, one of the ends being weighted to maintain the other end normally raised.



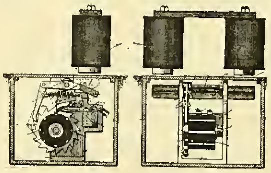
No. 537,673.

537,672. ELECTRIC RAILWAY. Jean Claret and Olivier Wuilleumier, Lyons, France. Filed Sept. 19, 1894. Patented in France, March 17, 1894, No. 237, 122 The permanent way rails are provided at crossings and junctions with insulating parts composed of lengths of rails connected or soldered together by an insulating substance poured in between them and vulcanized, constituting a compact and rigid body which is interposed in the line of rails joined end to end. (See Illustration).

537,673. ELECTRICALLY-ACTUATED VEHICLE. John B. Clark, St. Paul, Minn. Filed March 3, 1894. A framework mounted to run upon tracks and to this an axle is journaled, having pulleys upon its ends. Rims surround the pulleys and run upon the tracks. Friction rollers are supported in a framework and interposed between the rim and pulleys. There is a constantly running engine upon the framework adapted to actuate a dynamo, and an electric motor is adapted to be energized by the dynamo, and so connected as to actuate one of the friction rollers. (See Illustration).

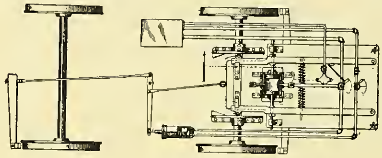
537,706. SECTIONAL CONDUCTOR FOR ELECTRIC RAILWAYS. James F. McLaughlin, Philadelphia, Pa. Filed Feb. 5, 1895. There is a rotary switch for each section of the working conductor, and traveling electro-magnets positively operate the rotary switches step by step to alternately close and open the circuit between the main conductor and the sections of the working conductor. (See Illustration).

537,715 SAFETY SUPPORT FOR OVERHEAD ELECTRICAL CONDUCTORS. Alexander D. Poole, Boston, Mass. Filed Aug. 13, 1894. The support comprises a frame of conducting material. Two studs are mounted upon the ends of the frame having an insulating sleeve and discs. Arms of conducting material are mounted upon the sleeves and between the discs. There are insulating blocks between the studs in the path of a projection on the arms, and a raised portion or web on the arms is arranged to form contact with the outer end of the frames



No. 537,706.

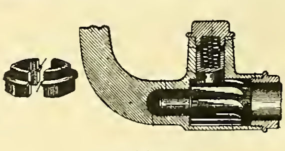
537,762. DROP FENDER FOR STREET-RAILWAY CARS. Lewis H. Finney, Richmond, Va. Filed Oct. 4, 1894. The fender has rearwardly extending side-arms, pivoted to the sides of the car truck. An arched cross-bar is secured to the end of the truck frame and a vertical post or standard is secured to the fender and passing up through a perforation in the arched bar. A reciprocating-rod has one end adapted to enter a slot in the vertical post or standard and its other end is hinged to a gravity trip-gate by which the front end of the fender is automatically dropped and reset.



No. 537,784.

537,783 SAFETY-CLUTCH FOR INCLINED RAILWAYS, &c. Malcolm C. Littleworth, Duluth, Minn., assignor of four fifths to Willard A. Gould, Wesley C. Gould, Martha A. Gould, and Ella C. Lake, same place. Filed Feb. 20, 1895 This is the combination in an inclined railway of an operating rope, stationary safety ropes, buffer cylinders located on a suitable support in a plane with the guide and having pistons connected to the latter ropes, and clutches on the cars adapted to engage the safety ropes by the act of the operating rope breaking.

537,784. AIR-BRAKE. Mortimer B. Mills, Chicago, Ill., assignor to the Mills' Improved Pneumatic Brake Company, same place. Filed Oct. 29, 1894. Fig. 2 reads as follows: "In an air-brake system for cars a reservoir, a pump for compressing air into said reservoir, and operating means for the pump, comprising, in combination, a rotary disc, actuated by movement of the car, and provided on its face with a segmental cam *t*, a lever-rest at one side of the annular path of the cam, a pivotal pump-lever connected with the pump-piston, shifting means for the lever, actuated and controlled by pressure from said reservoir, for moving the lever between the lever-rest and the cam, and spring mechanism for maintaining the lever in contact with the cam when shifted thereto." (See Illustration).



No. 537,800.

537,800. STREET-CAR BRAKE-HANDLE. Francis L. Bouquet and Patrick Flood, St. Louis, Mo. Filed Jan. 28, 1895. A brake-handle works loosely over the end of the spindle and its ratchet teeth and carries a spring paw which engages with the teeth, the handle being retained in place by a divided ring-nut screwing into it from below. (See Illustration).

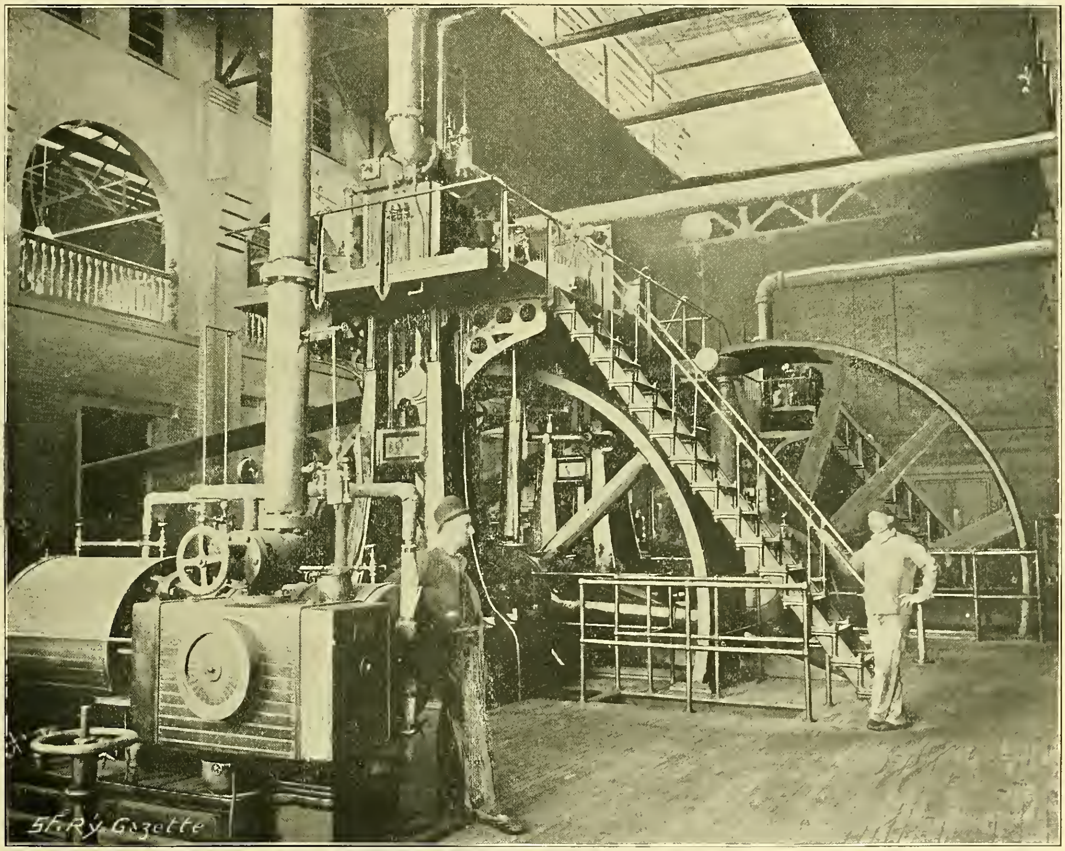
537,809. CAR-FENDER. Isaac L. Vansant, Philadelphia, Pa., assignor of one-half to Edward H. Johnston, same place. Filed May 3, 1894. The fender has a frame with an oscillating horizontal shaft and a vertical rod is suitably journaled. There is meshing gearing on the shaft and rods, and springs are connected with the shaft and its bearings.

Street Railway Gazette.

Vol. XII. NEW YORK, MAY 4, 1895. No. 18.

North Hudson County Railway of Hoboken, N. J.

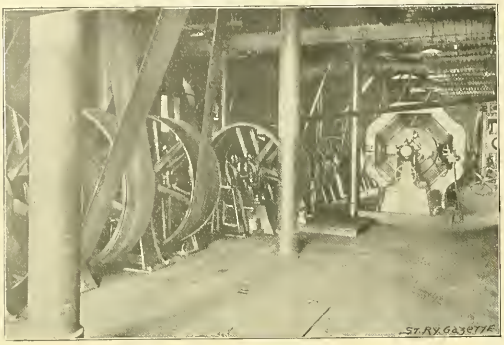
The North Hudson County Railway Company, of Hoboken, N. J., operates about 83 miles of electric, horse and steam railways. In this extensive railway system are to be found many features of engineering interest which may be studied with great profit. The company's lines extend through Hoboken, Union Hill, Weehawken, West New York and Guttenburg. The principal eastern terminus is at the Barclay street ferry and a viaduct is constructed from this point to Jersey City Heights. The road is then elevated for a distance of one and one-quarter miles to the Court House. The elevated structure is similar in appearance to that in use in New York City. The second eastern terminus is at the Hoboken ferry house of the Fourteenth street ferry, from which a line extends north to Weehawken.



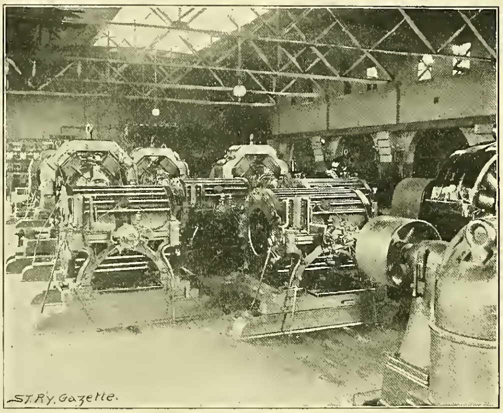
FOURTEENTH STREET POWER STATION.

The cars on the viaduct were operated by cable until June, 1892. Shortly before that time electricity had been introduced as a motive power on the upper part of the line, and to prevent the necessity of transferring passengers it was decided to operate electric cars on the incline. As the motor cars proved entirely satisfactory, the cable line was entirely abandoned and the cable machinery was sold for old iron.

The company's power station is located at Palisade avenue, Ferry street and Ravine avenue. Its dimensions are 200 by 100 feet, the first story being constructed of brick and the second of wood. Plenty of light is afforded by windows extending practically around the entire building. Power is furnished by two Watts-Campbell Corliss engines of 500 hp each and three Ball single expansion engines of 250 hp each. The Corliss engines were installed to operate the cable winding machinery, but when that motive power was abandoned, they were employed to drive two multipolar General Electric generators. The engine speed is 65 revolutions per minute; in the cable work the speed was only 48 revolutions per minute. Each of the Ball engines is connected to two 125-hp Thomson-Houston multipolar generators by 15-inch Schieren belts. Steam is generated in six 125-hp boilers constructed by the Consolidated Iron Works Company of Hoboken. Korting injectors and pumps of the Worthington duplex and Knowles types are used.



COUNTER SHAFTING, FOURTEENTH STREET STATION.

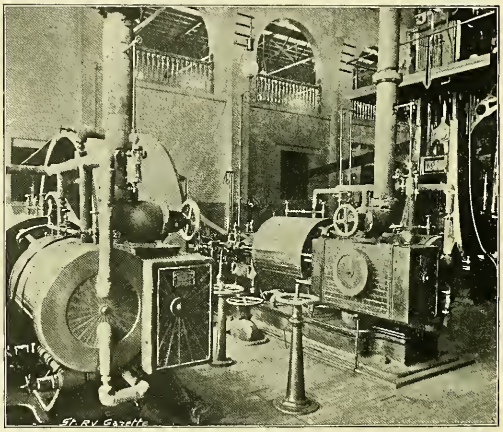


GENERATORS AT FOURTEENTH STREET STATION.

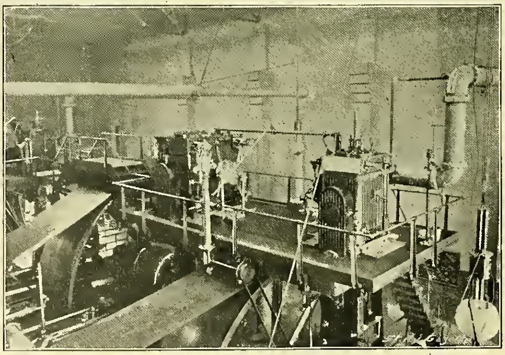
Current is also supplied for the railway from the station of the Hudson Electric Light Company, of Hoboken, views of which are presented herewith. The building is located at Fourteenth and Bloomfield streets, and is constructed of brick with stone trimmings, its dimensions being 100 by 100 feet. The power equipment consists of two vertical cross-compound Philadelphia Corliss engines of 500 hp each, one horizontal cross-compound engine of the same make of 1,500 hp and one McIntosh & Seymour cross compound engine of 650 hp. These engines, with the exception of the largest, are connected by 48-inch belts furnished by the Charles A. Schieren Company, to two lines of counter shafting which was constructed by the Holyoke Machine Company of Holyoke, Mass. The belts from the counter shafting extend to the generators on the floor above. The 1,500-hp horizontal engine is coupled directly to two General Electric 500 kw multipolar generators. Steam for the station is supplied by eight horizontal return tubular boilers. The following electrical apparatus is located on the second floor. Four 100 kw General Electric multipolar railway generators, ten General Electric 50-arc light machines, three General Electric 2,500 light alternators, one 650 light alternator and one 80-arc light Wood machine. The dynamo room is well lighted by large windows and is equipped with a Yale & Towne traveling crane of 12,000 pounds capacity. The switchboard is located in the rear end of the room and extends the entire width of the room. A neat and serviceable wrenchboard shown herewith was designed by the engineers of the station. It is constructed of white wood in which the places for the wrenches were cut out by a jig saw. It is backed by a board and framed with 2-inch moulding.

The company operates about 190 cars which were constructed by the John Stephenson Company, of New York, and the J. G. Brill Company, of Philadelphia. They are mounted on trucks furnished by the Peckham and Brill companies. The cars are of three different lengths, 18, 20 and 22 feet and they are equipped respectively with the W. P. 50, G. E. 800 and the G. E. 1,200 motors constructed by the General Electric Company. All the cars are equipped with the Bonta electric emergency brake which was described in the Street Railway Gazette of April 20

The track construction throughout the system is of a very substantial character. Several miles are laid with girder rail, weighing 100 pounds to the yard, supplied by the Maryland Steel Company. Rails employed in other sections of the system were rolled by the Johnson Company, of Johnstown, Pa., and weigh 50, 70 and 80 pounds to the yard. For the elevated portion of the line 67-pound T rails are



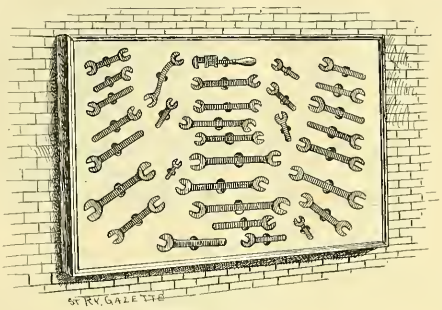
McINTOSH & SEYMOUR ENGINE, FOURTEENTH STREET STATION.



VIEW OF VERTICAL ENGINES FROM THE GALLERY, FOURTEENTH STREET STATION.

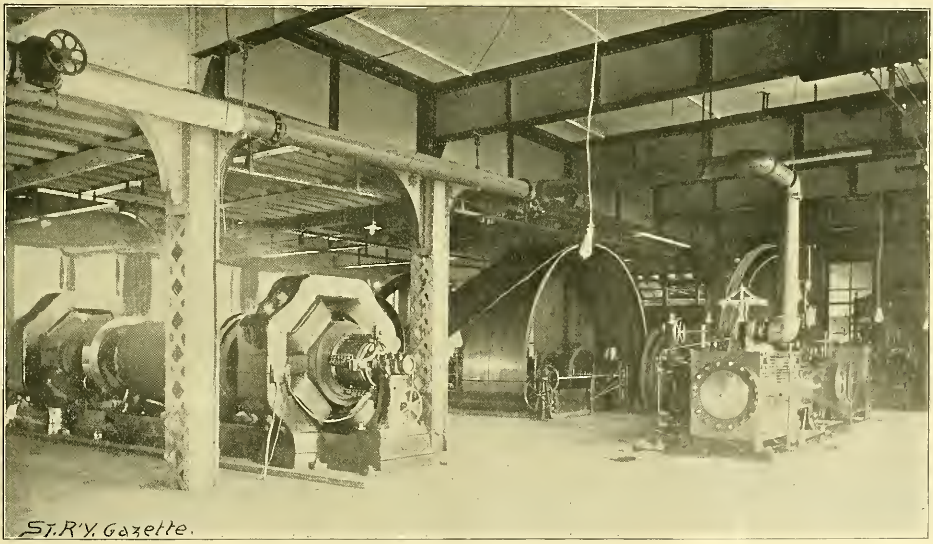
laid, bonded at the joints and grounded to the structure. The guard rails on the Court House extension are steel angle bars held by cast iron chairs which are bolted to the ties.

An interesting and expensive piece of track construction is that on the Hillside line. This road commences at the head of Fifteenth street, Hoboken, on a trestle extending parallel to the hill for a distance of 900 feet. The line ascends by a series of easy curves for 3,600 feet, the steepest grade being 5½ per cent. and the least 1½ per cent. There is scarcely a section of over 50 feet that is without a departure from a straight line and the estimated cost of the half mile track was $100,000. It is laid with 56-pound T rails rolled by the Pennsylvania Steel Company. The rail is 4¼ inches in height and bolted to its inner side is a guard rail, making it almost impossible for a car to be derailed.



WRENCH BOARD.

The overhead construction on the line is of a very substantial description. One of its features is a section insulator devised by A. K. Bonta, electrical engineer of the company. It consists of two 1½ by 1½ inch wrought iron bars 10 inches in length held together by bolts on which are porcelain insulators and a wooden insulator about 24 inches in length of a slightly curved shape. On the upper side of the latter are two projections by which it is attached to a wrought iron link by bolts. On the under side of the wooden insulator a tongue is formed which serves to guard the trolley wire. The ends are protected by caps, having lips clinched around the trolley wire for holding it to the insulator.

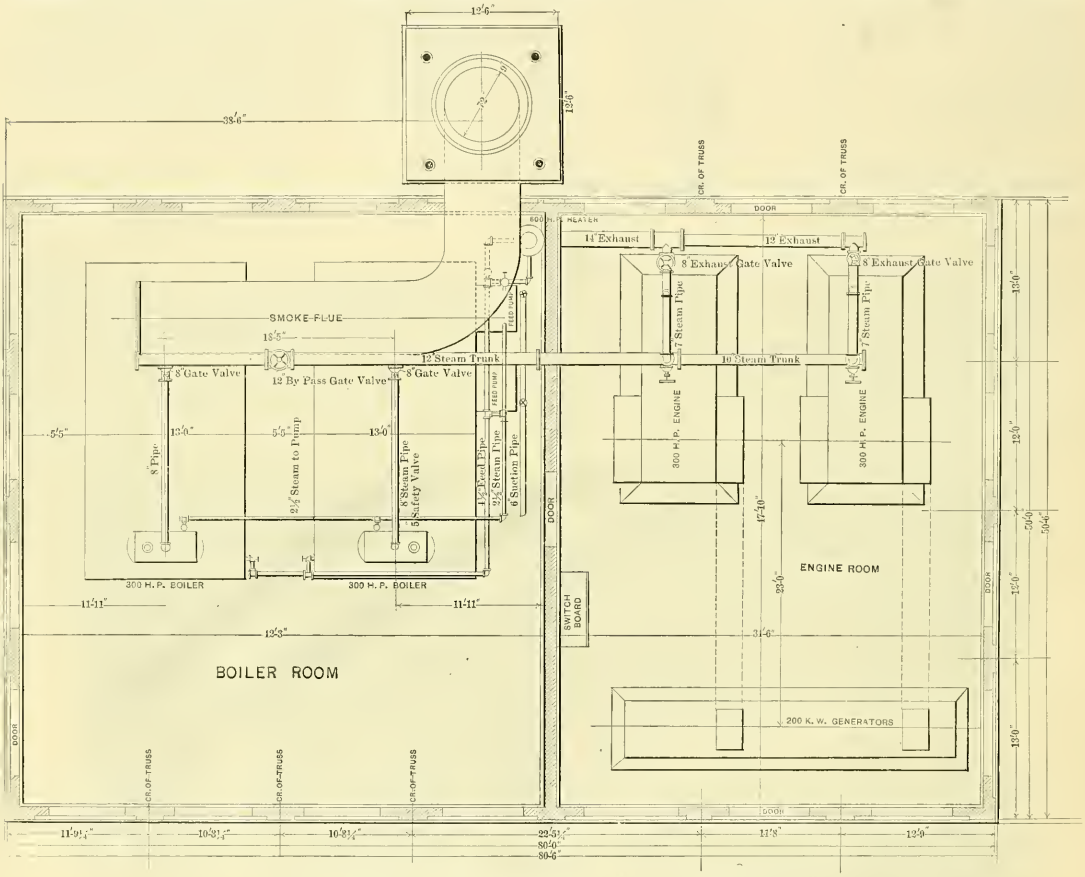


PALISADE AVENUE POWER STATION.

One of the interesting features of the operating system of the company is its method of electrical signaling in connection with its patrol service. It was arranged by Mr. Bonta, and the system is such that it is possible to send signals from any point along the line to the patrol stations of the company, so that the men in charge of the latter may understand what the trouble may be and where it is located. The signal boxes, which are similar in appearance to those used in the fire departments, are attached to the poles and are located every quarter of a mile throughout the entire line. They transmit six signals which are marked in plain letters on a circular brass disc as follows: No. 1. Car off the track. No. 2. Broken axle. No. 3. Trolley wire down. No. 4. Telephone call. No. 5. Rush call. No. 6. Special call.

An extensive repair shop and car barn have been constructed at West Hoboken, occupying a plot of ground 300 by 300 feet. It is equipped throughout with improved machinery and all repairs to motors, trucks and cars as well as the reconstruction of old cars are executed on the premises. In this connection Mr. Bonta has arranged a complete system of blank forms for keeping the record of all repairs. Before taking out a car a motorman is required to give it a thorough examination to determine its condition and to indicate the fact on a blank form furnished for the purpose. This report which shows the condition of the car is dropped into a box in the car house. When the motorman's day's work is done, he fills out a second blank on which the condition of the car at this time is again noted. This also is deposited in a box provided for the purpose. The blanks are collected by the car inspector, and if repairs are necessary, an entry to that effect is made in the proper book and the car is sent to the repair shop. When the repairs have been completed, another blank form is filled out by the foreman of the repair shop and the particulars are entered in a book. The car then goes into service and the record of its condition is made on a blank form as indicated before. The forms are inspected daily by the superintendent, who thus is enabled to gain a thorough idea of the extent and character of the repairs needed on the cars. As a large number of men are employed, it would not be a difficult matter for a motorman who did not wish to report an accident to his car, to keep back a form, unless some check was provided. The superintendent, therefore, has introduced a checking system, so that when an employee fails to turn in his form, the fact becomes at once apparent. A board attached to the wall contains a number of holes with plugs, each plug bearing a number representing a motorman. When the inspector examines the returns he pulls out a plug for each report. By this method the failure of a motorman to turn in his form is seen at once. Men who apply for positions as motormen are first required to serve as conductors for some time in order that they may familiarize themselves with the running of the car. They then work five days under the instruction of an expert motorman. They report to the superintendent at the expiration of this time and if found competent, are given a regular car. Accident reports are filled out by the motorman and are handed to the train master.

The company operates at the present time about 18 miles of steam road, about half of which will be equipped for electric traction within three months, and it is expected that the whole mileage will eventually be electrically operated.



PLAN OF POWER STATION—DETROIT & MT. CLEMENS RAILWAY.

Detroit & Mt. Clemens Electric Railway.

In the construction of the Detroit & Mt. Clemens Electric Railway an effort has been made to follow steam railroad practice and to avoid some of the features frequently encountered in electric lines of this kind. Too often heavy grades, sharp curves and cheap construction generally are characteristics of interurban lines, and in consequence car trips are slow and maintenance is a heavy item of expense. The Mt. Clemens road is practically without curves and grades and the track construction is of the best description, with the result that fast time is practicable and the cost of maintenance is relatively small.

The line which connects Detroit and Mt. Clemens is 15½ miles in length and is built upon the property of the Plank Road Company. The track is located about ten feet from the eastern edge of the plank road proper.

The elevation of the road is above that of the surrounding country, thus affording excellent drainage for the road bed. Large culverts are being introduced all along the line ample to meet the greatest possible demands.

The rails weigh 70 pounds to the yard and were manufactured by the Carnegie Company of Pittsburgh. Six-hole double angle joints are used, and these are provided with ¾-inch bolts, with nut locks and washers. For each mile 2,640 ties are laid, and under the ties, supporting each joint of the track, a tie is laid longitudinally. The road is ballasted with gravel taken from the company's gravel pit, situated on the line. The gravel is thoroughly tamped and packed hard under and between the ties. The gauge of the line is 4 feet 8½ inches.

W. A. STERN.

I. H. SILVERMAN.

Over the Clinton River at the road's entrance to Mt. Clemens a three-span steel truss bridge is being erected. This bridge will be built upon stone abutments and iron and cement piers, and will be located 30 feet north of the present bridge and line of the plank road. At this point, where the railroad leaves the plank road, private property has been purchased by the railway company. The bridge is being built by the Detroit Bridge Works Company.

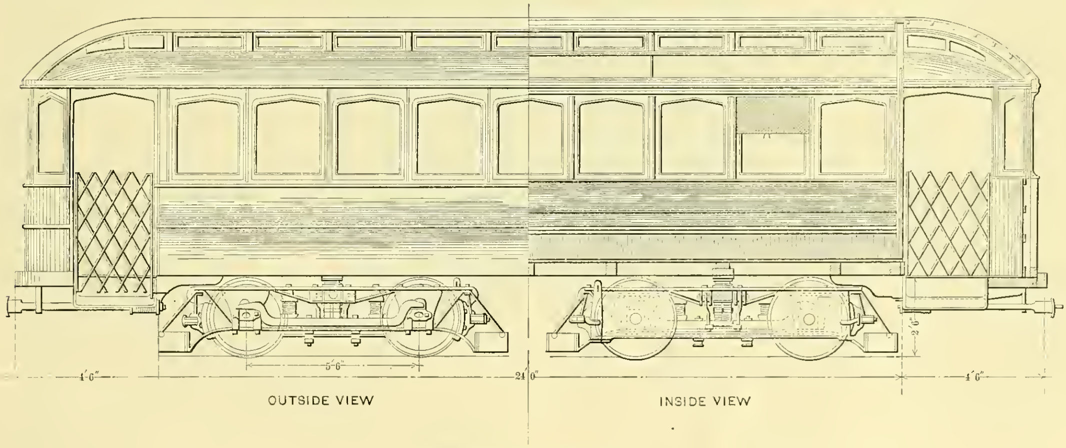
The overhead line work between the city of Detroit and the entrance to Mt. Clemens is standard bracket construction. The wrought iron brackets employed are made especially heavy and carry the trolley wire. The best form of insulators and overhead parts are used, and were made by the General Electric Company. Cross arms are erected upon the poles, and upon these arms the necessary feeder wire of 420,000 cm capacity are run. The line is properly protected by lightning arrestors. In the town of Mt. Clemens ornamental wrought iron poles set in concrete and cement are used on both sides of the streets and cross suspension work is here employed. The line in appearance for the entire distance is straight and in perfect alignment with the track.

The motor cars are of modern design and similar in appearance to standard steam railroad cars. They are 33 feet in length, vestibuled at both ends, 8 feet wide, and mounted upon double trucks having wheels 33 inches in diameter. The cars are straight sided with steam car roofs. The interior finish of the car is hard wood, the windows are large, with English glass, spring curtains and wide arm rests.

The seats have been arranged at right angles with the length of the car, with a centre aisle between them. They are fitted with springs and backs and are upholstered in cane. There are two rows of double seats, nine on each side, each car seating, in all, 36 passengers. The centre aisle is 18 inches wide. The cars are brilliantly lighted with ten 16-cp incandescent lamps each, and they are provided with headlights and reflectors.

The line will be opened with eight motor cars and eight ten-bench open trail cars, each of the latter having a seating capacity of 50 persons. These cars will be lighted in a manner similar to that of the motor cars. The cars and trucks are furnished by the Jackson & Sharp Company of Wilmington, Del.

In order to propel the cars at a high speed, two motors are furnished for each car, having an aggregate capacity of 100 hp. These motors are specially designed with a view of great strength, power and speed, and are guaranteed to operate the motor car and trailer, fully loaded, at a constant speed of 35 miles an hour.



PLAN OF MOTOR CAR.

The buildings for the power plant and the storing of cars are situated midway between Detroit and Mt. Clemens, immediately upon the line of the road, with ample provision for any increase likely to occur during the next 25 years. The buildings are constructed entirely of brick and steel. Steel columns and trusses are employed for the support of the roof, and the walls are built of brick. The roofs of both power house and car barn are built of iron, and that of the power house is lined with hard wood, making it moisture proof.

The power station is 80 feet 6 inches in length and 50 feet 6 inches in width, and the interior is divided by means of a fireproof wall, one room being used for the boilers and the other for the engines, dynamos, etc.

The car barn is entirely fireproof, and is 55 feet wide by 155 feet long. It will accommodate 20 cars and will contain every convenience for repair and handling of cars. Two pits each 65 feet in length have been built of brick and cement for the purpose of facilitating the examination and repair of motors, trucks, etc. A repair shop has been erected in the rear end of the car barn with dimensions of 28 x 12 feet, and in the front part of the building two offices have been erected, one for the general superintendent and as a waiting room, and the other for the motormen and conductors.

There are in the power plant two water tube boilers, which when operated at a pressure of 80 pounds will develop 300 hp each. The settings and foundations for these boilers are built of the best Detroit brick, and while the boilers will only be operated at 80 pounds, they have been built with a view of carrying 125 pounds working pressure if at any time it may be desired.

A steel smokestack 72 inches in diameter, reaching 90 feet above the grate bars, is to furnish draft for the boilers. It is made of small sections riveted together, with a ladder reaching to the top of the chimney. The base or foundation of the stack is 12 feet 6 inches and 21 feet high; it is a solid foundation built entirely of brick, piling with concrete and cement being first used.

To drive the generators two 330-hp high-speed automatic engines will be employed. They are to be erected upon foundations built of brick 6 feet in depth. These engines are so governed that they will automatically take up any variation in the load. The piping has been planned for any increase that may occur for some time to come, and to be used for either high or low pressure.

Two generators furnish the necessary current for the operation of the road, each having a capacity of 200 kw. They are automatic and of the latest design and erected upon foundations built of brick 5 feet in depth. The dynamos and motors were furnished by the Walker Manufacturing Company, of Cleveland, O. The switchboard, which is of considerable magnitude, is built of slate and made fireproof throughout.

There is but one route between Detroit and Mt. Clemens at present, and that is a steam railway having its station in Mt. Clemens one mile from the heart of the town. The train service has always been unsatisfactory, particularly so on Sundays, when only one train each way is operated.

The line of the Rapid Railway Company is being built with a view of carrying passengers, freight, etc., between both points, and the company has a traffic agreement with the Detroit Citizens' Passenger Railway Company enabling it to carry passengers from Mt. Clemens and along the line to the centre of Detroit and vice versa without change of cars. The principal owners of the Rapid Railway Company are ex-Judge Cornelius J. Reilly and Mr. Chas. M. Swift, both of Detroit, and also the principal owners of the Wyandotte & Detroit River Railway, running from Wyandotte to Detroit to the southern end of Detroit, a distance of about 10 miles. The population of Detroit is 210,000, and that of Mt. Clemens independent of the floating population is 8,000. The population between the two termini is about 10,000, and the character of the residences denotes the prosperity of the surrounding country. Every detail as to the character of material and construction has been well studied, and plans carefully carried out by the general engineers and contractors, Stern & Silverman, of Philadelphia.

The Rapid Street Railway Company, for the construction of the road, has issued $300,000 worth of first mortgage bonds at 5 per cent. for 20 years. Those who are interested in the property base their belief that it will prove a profitable investment by comparing it with the Wyandotte & Detroit River Railway now in operation between the River Rouge and Trenton in the south of Detroit. This road is 10½ miles in length and is operated by electric cars running at an average speed of 15 miles an hour, three cars being necessary to give a half hourly service. The line of the Rapid Railway Company is 15 miles in length and its cars will be operated at 20 miles an hour, thus giving for the same number of cars the same headway as that on the Wyandotte road. A comparison between the actual expenses of the latter road and the estimated expenses of the proposed road shows that the latter will be considerably less. The total in the former case is $22,933.48 and of the new line $18,502.64. In each case the number of cars and trips is assumed to be the same. The new road expects to make a saving in the following items: Track and line repairs are assumed to be $1,333.32 as compared with $2,200 for the Wyandotte road. This saving, it is believed, will be possible because of better construction in the former case. Owing to its organization and location the company also expects to make savings in fuel and in labor. Assuming, however, that the annual operating expenses will be $25,000 and the interest $15,000 per year, the sum needed for all the requirements of the property will be $40,000. To earn this sum it will be necessary to carry 277,000 passengers each year, the average fare being estimated at 14 4-10 cents per passenger less 4 per cent. reduction for insurance. Last year the Wyandotte road carried 400,000 passengers and those interested in the new road assert that its advantages are relatively far greater, and it may be expected to carry many more passengers. It is stated that it runs through a territory that is far more populous than that in which the Wyandotte road is built and at the same time the competition will be much less. The new road also has exceedingly satisfactory terminal facilities in the city of Detroit. According to an agreement made with the Citizens' Street Railway Company, of that city, the Rapid Company's cars will be carried into the centre of the city of Detroit.

Burying Wires in Boston.

The commissioner of the wire department in Boston is extending his policy of burying wires and has determined what must be done in this direction during 1895. The feed wires of the West End Street Railway Company are to be put under ground as far as Adams Square. It is the policy of the department, where no conductors cross the trolley wires, to order the removal of guard wires. The West End Company would be glad, it is stated, to remove all guard wires, but the wire department has made the announcement that it is not yet ready to permit their removal except on streets where other wires are so distant as to make it impossible for them to come in contact with the trolley wires. The commissioner, a few days ago, granted the company permission to remove the guard wires on Washington street to a point 150 feet north of Dover street.

Street Railway Engineers—II.

FRANK SILLIMAN, JR.

Mr. Frank Silliman, Jr., has held the position of electrical engineer of the Atlantic Avenue Railroad Company, of Brooklyn, N. Y., since April 1, 1893. He has had a broad practical experience which has well qualified him to discharge the wide range of duties devolving upon the heads of the engineering department of so extensive a road as that operated by the Atlantic Avenue Company. Mr. Silliman was born in Ashtabula, O. He received his technical education in the Baltimore & Ohio School of Technology, in Baltimore. His experience with electric work commenced in 1889, when he entered the service of the Brush Electric Company, in Cleveland, O. While arc lighting was the principal feature of the company's business at that time, it was constructing electric railway apparatus, and Mr. Silliman was engaged on this branch of the work during a portion of the time he was connected with the company. He next joined the force of the Thomson-Houston Company, in Boston, in the railway department, being associated with Mr. L. H. McIntire.

FRANK SILLIMAN, JR.

While in this position he prepared the plans for a number of important power stations. When Mr. McIntire left the company Mr. Silliman accepted a position from him, and for a considerable time he was engaged in railway constructing.

Included in this work was the building of the power stations in Chelsea and Lynn, for the Lynn & Boston Street Railway Company. While in the employ of the Thomson-Houston Company he had been engaged on the preparation of plans for these structures. He also for ten months was occupied with the construction of the City & Suburban Railway, in Savannah. Mr. Silliman subsequently accepted the position of electrical engineer of the Atlantic Avenue Railroad. In this position Mr. Silliman has charge of the mechanical and engineering departments, his supervision extending to the power station, tracks, overhead structure, cars, etc.

Since his connection with the company he has introduced a number of improvements in the departments, and his work has been marked by great success.

Cable Service Discontinued in Philadelphia.

Electric cars are now operated over the Seventh and Ninth Street line of the Philadelphia Traction Company, formerly operated by cable. The new trolley route extends from McKean street to Broad and Cambria streets, there connecting with the Germantown line. The conduit construction is to be torn out and this work is to be carried on at night when the cars are not in operation. The contract has been awarded to E. D. Smith & Company and it is stated that the work will begin at once. During the day the work will be principally preparatory, consisting of excavating about the conduit. As there are only four hours when cars are not running on the line, the work must be carried on expeditiously in order that progress may be made.

Chicago Street Railway Suit.

In a recent issue of the STREET RAILWAY GAZETTE mention was made of the fact that the Chicago General Street Railway Company endeavored to run one of its cars on to the line of the Chicago City Railway Company. The terminus of the former company's road is at the bridge on West 22d street, and thus far it has been unable to secure a downtown outlet for its cars. The manager of the company then announced the surprising theory that the city possessed the right to give a company the privilege of running its cars upon the tracks of another company even if the latter objected. This theory was based upon the assumption that the rights to the street were vested in the municipality and could not be parted with. The company decided to have the courts pass upon the correctness of this theory, and, in order to make a test case, ran one of its cars over the tracks of the Chicago City Railway Company. The car was stopped and employees of the Chicago City Company wrecked it so that it could proceed no further. The Chicago General Company has, therefore, filed a suit againt the Chicago City Railway Company, demanding $300,000 damages for destroying its car at this time and for interfering with its alleged rights. The company bases its confidence on winning the suit upon a decision just handed down by the Appellate Court. In the course of the decision it is stated that the street is subservient to the public use, and neither by the authorities of the city nor by the consent of the abutting property owners can the public be excluded.

Brooklyn Heights Railway Company Indicted.

The Kings County grand jury on Thursday last found an indictment charging the Brooklyn Heights Railway Company with manslaughter in the second degree, for causing the death of Mrs. Mary A. Medinger, who was killed by an electric car on March 26 last. The bill sets forth that the accident was the result of "wilful, culpable carelessness." The indictment contains the charge that the cars of the company are operated at unsafe speeds and are not equipped with proper fenders. The company claims that the accident was due to the carelessness of the victim, who, after leaving a car walked around the back of it and was struck by a car traveling at a proper speed in the opposite direction.

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REPORT OF THE GENERAL ELECTRIC COMPANY.

The report of the General Electric Company which has just been made public contains facts of no little interest. The business for the year 1894, when the conditions were certainly adverse, aggregated over one million dollars a month; the exact amount was $13,263,611.58 and the gross profit was 13.6 per cent. The net profit is equivalent to 3.44 per cent. on the common stock; a showing which under the circumstances would seem favorable. With reference to patent litigation the company states that several important suits on railway patents owned by the company are now in progress and some of them will be argued this spring. In the engineering department much has been accomplished, the report states, in the development of large power units, while the only successful work yet executed in the operation of elevated roads by electricity has been done by the company. It is now engaged in important installations of underground conduits for street railways. It is also mentioned that important work has been done in the development and perfection of street railway apparatus.

ELECTRIC MAIL CARS.

The postoffice officials in Washington are greatly interested in utilizing street railway systems for the rapid distribution of local mail, and they are now extending the service to the great cities. Electric mail cars have just made their appearance in Boston, where the system has been organized on a much more liberal scale than has yet been attempted in any other city. Eight mail cars have been equipped on the plan adopted in the regular railway mail service, and their operation will, beyond a doubt, prove of vast convenience to the public. The preliminary trials that were made by the postoffice authorities to determine the possibilities of the new system indicated that the saving in time would be very considerable, and the results that will follow the regular operation of the new cars will doubtless be even more advantageous than were foreshadowed by the experiments. It certainly looks as if the prediction made by an enterprising western postmaster that in all cities the old-fashioned slow-going mail wagon would be obliged to give way to the rapidly moving street railway car would be realized in the near future. Within a comparatively short time mail cars will be operated on the street railway tracks in Chicago and Philadelphia, and plans for the extension of the system to New York are under consideration.

A ST. LOUIS ORDINANCE.

An ordinance has just been adopted in St. Louis that should have the important effect of reducing materially the number of street railway accidents in that city. According to its provisions, a child under 15 years of age who jumps on or off a moving car is guilty of a misdemeanor and is liable to a fine of $10. It is surprising that the accidents from this common practice are not even greater than they now are in view of its prevalence, and of the risks that heedless children assume. A St. Louis paper states that the local street railway managers estimate that 25,000 cases of children jumping on or off cars daily occur in that city. This rough guess appears extravagant until one makes an independent count, when it seems to be far more reasonable. The practice was dangerous enough when only horse cars were in service, but with electric and cable cars, traveling at comparatively high speed, it is attended with much greater risk. With the increase in danger the practice seems to exercise a greater fascination over young boys, and the needs of such an ordinance as that adopted in St. Louis become apparent. The measure was passed by the Council because it was discovered that a number of accidents were traceable to this common practice. In a single week it was noticed that one boy was killed outright and seven were more or less injured while stealing rides. Newsboys are not exempted in St. Louis, but according to the orders of the chief of police, they will be arrested whenever they are detected violating the provisions of the ordinance. The regulation is an excellent one, and its general adoption and enforcement would lead to a decided decrease in the lengthening list of accidents caused by rapidly moving cars in large cities.

SPEED OF ELECTRIC CARS.

Brooklyn is in a chronic state of dissatisfaction with the operation of its electric cars, and the latest developments would seem to indicate that the trouble lies with the people and not with the companies. The slow speed of the cars is now exciting public indignation, and n view of the agitation which led to the reduction in the rate of speed at which cars are allowed to travel, the existing dissatisfaction has its humorous side. A few weeks ago, it will be remembered, there was a great hue and cry over excessive trolley speeds. The companies were roundly denounced for permitting their cars to be operated too rapidly, inspectors were appointed to report cases of excessive speed and motormen were arrested on the complaints of these new officials. The Board of Aldermen then took up the matter and passed an ordinance in which the maximum speed was limited to 10 miles an hour, but still the public was not satisfied. The Council immediately adopted new regulations in which the maximum rate was reduced to 8 miles an hour. It is a curious fact that it was then believed that the public would cease its complaints, but our prediction that the change would cause even greater dissatisfaction, because the new ordinance would make rapid transit, which the people had become accustomed to and demanded, out of the question, has been abundantly verified. The new regulation went into force on Monday last, to the utter disgust of the patrons of the surface lines. The companies complied with the new measure in good faith, and soon it became apparent that the service was no better than in the old days of the horse cars. The dissatisfaction became more pronounced than ever, and a demand for improvement is now emphatically made. The officers of the companies are in a position to appreciate the humor of the situation. They are not responsible for the unsatisfactory character of the service; the blame falls on the Board of Aldermen, and the latter will eventually find it necessary to rescind its ordinance in order that the public may be less dissatisfied. The people are now used to modern rapid transit, and they are not likely to put up with any permanent return to the conditions that existed in the days of the slow-going horse car. As one of the local newspapers puts it: "If the city government and the companies do not unite to put an end to the existing 'snail transit' the people will unite to get it by far rougher means." Just what this signifies is not clear, but it indicates that the public does not regard slow speed on electric roads with favor.

Funeral of William J. Richardson.

The funeral of William J. Richardson, secretary of the American Street Railway Association, took place last Monday afternoon in the Hanson Place Baptist Church in Brooklyn. For a quarter of a century Mr. Richardson had been a member of this church and at the time of his death was one of its deacons. There was a large attendance at the services, including the representatives of a number of street railway companies. The floral tributes were elaborate and covered the pulpit platform. A large cross of ivy, lilies and roses was sent by the Atlantic Avenue Railway Mutual Aid Association, of which organization Mr. Richardson had been the president since its organization. A sheaf of palms and lilies was sent by the officers of the same organization. Many other floral offerings came from societies with which Mr. Richardson had been connected. The services were conducted by the Rev. A. C. Dixon, pastor of the church. He spoke at length of Mr. Richardson's many noble traits of character and dwelt particularly on his intense interest in religious work. In speaking of his character, he said: "He was the soul of integrity, honesty and conscientiousness. He was true to every trust. In business there was no place for the tricks of the trade. He was always a discordant element in boards of corporations where doubtful or dishonest measures were planned. Insincerity could not live in his presence; everywhere he was a rebuke to sham or untruthfulness."

Free Fares for Policemen.

Governor Morton, of New York, has signed the O'Sullivan bill which provides that the mayor may issue certificates to policemen giving them free transportation on street cars when in the performance of an official duty. Since Jan. 1 last, when the new constitution went into force, the policemen have been obliged to pay their own fares. The expense caused a considerable drain on the fund provided for contingent expenses of the police department, and so much dissatisfaction was found with the existing arrangement, that the bill was introduced allowing them to ride free hereafter.

The Bonta Electric Emergency Brake.

To the Editor of the Street Railway Gazette:

I have just read in the Gazette of April 20 an account of the Bonta electric emergency brake and I notice you state that it has recently been patented. I have read the description carefully and I find that it is exactly what I have been using on our steep grades for over three years with perfect satisfaction. An account of my electric brake has been published, but I do not remember the dates when the description appeared, but it was certainly more than a year ago, perhaps two. I have been exasperated that I did not have the brake patented three years ago, as the description of the Bonta brake represents it to be exactly the same device as mine. I came to put the brake into practical operation in this way: We were operating one car over a 12 or 13 per cent. grade and had two accidents by the car running away. As there was a curve at the bottom of the hill and one of the main lines crossed at right angles, such performances were a very serious matter. The company talked of abandoning the line on the hill and of building around it in another way or tearing the line up altogether. I then proposed the electric brake so that the hill line might be operated in safety. I applied the brake, and since that time the line has been operated without a single accident and without a flat wheel; the latter was almost a weekly occurrence with hand brakes. I kept on adding one brake after another until now I have a great many in operation. The men who operate the cars with the electric brakes are not worn out as when the hand brakes are used and are in a much better condition to perform their other duties. As they are not occupied constantly with wrestling with the hand brake, the liability to accident on account of negligence is not so great. As a simple movement of the switch handle stops the car in about a single car length when it is at full speed, we have a condition of safety which is infinitely superior to that which can be attained with the old style of brake. It is also to be recognized that this braking effect is perfectly automatic. A current is set up in the motors, the strength of which is in direct proportion to the speed, and hence, the braking effect is greatest when the speed is greatest. The effect dies away when the speed is reduced, and of course when the car stops the braking effect has disappeared. Again, inasmuch as the generation of the braking current depends upon the revolution of the wheels (the armature being geared to the axle), if the wheels begin to slide the armature stops revolving and the current is all gone. There is no braking effect, and the wheels commence to roll again, but as they begin to revolve, the current is again set up and the braking effect is available and so on in a perfectly automatic way. The braking principle incorporated in this device is certainly an ideal method. I wish to say that I put this attachment on our old Sprague switches (remodelled) for less than $1 each. It can be applied to any switch for a small sum by my way of doing it. A number of well posted authorities to whom I have shown the practical operation of the brake have told me that I was foolish for failing to protect my rights, and I have come to the conclusion that they are right. I. B. Walker.

Sioux City, Ia., April 24, 1895.

Report of the Brooklyn Heights Railway.

The report of the Brooklyn Heights Railway Company for the first quarter of 1895 has just been made public. The deficit for this period is $527,010.14. This is the quarter in which the strike occurred, and the street railway officials state that the showing is not, under the circumstances, a bad one. For the same period in 1894 the deficit was $158,684.33. The principal features of the report for 1895 and the previous year are given herewith:

	1894	1895.
Gross earnings from operations	$908,219 07	$603,374 49
Operating expenses, exclusive of taxes	678,721 97	669,850 10
Net earnings from operation	229,497 10	(d) 66,475 61
Income from other sources than operation	56,274 05	52,225 57
Gross income from all sources	$285,771 15	(d) 14,250 04
Deductions from income:		
Interest on funded and floating debt, taxes and rentals	$444,455 48	$512,760 10
Net income from all sources	(d) $158,684 33	$527,010 14
Total net deficiency March 31, 1895		$415,956 28

The increase in fixed charges is due to the fact that additional taxes have been imposed by the city. During the same quarter last year, there were no charges for interest upon collateral trust notes, of which $1,875,000 have been issued and are now bearing interest. President D. F. Lewis, of the Brooklyn Heights Company, states that while the showing is not a good one, yet the company will make it up eventually. It is now, he says, in a position to conduct its affairs as it desires, for the best interests of all concerned. Before the strike, Mr. Lewis says, the company was hampered by agreements with the men.

Speed of Trolley Cars.

The provisions contained in the recent ordinance of the Brooklyn Board of Aldermen relating to the speed of trolley cars went into force on Monday last. According to the new arrangement, cars may travel at the rate of six miles an hour in the central part of the city and in the outlying districts they may be operated at the rate of eight miles an hour. The change has thus far proved very unpopular with the patrons of the several lines. It has been found that the new schedules do not give a speed that is much greater than that of the old horse cars, in fact, in some instances, it is even less. The following figures taken from the timetable of the Brooklyn Heights Railroad Company show that the residents of Brooklyn have good reason to find fault with the new arrangement. Fulton avenue line, by horses, according to the old time table, 53 minutes; old electric schedule, 46 minutes; new schedule, 53 minutes. Gates avenue and Broadway line, by horses, 37 minutes; old schedule, 34 minutes; new schedule, 46 minutes. Ridgewood and Gates avenue line, by horses, 48 minutes; old schedule, 45 minutes; new schedule, 55 minutes. Myrtle avenue, by horses, 44 minutes; old schedule, 38 minutes; new schedule, 49 minutes. Union avenue, by horses, 42 minutes; old schedule, 35 minutes; new schedule, 44 minutes. Bushwick avenue line, by horses, 40 minutes; old schedule, 33 minutes; new schedule, 40 minutes. Greenpoint line, by horses, 54 minutes; old schedule, 48 minutes; new schedule, 58 minutes. Putnam avenue line, by horses, 44 minutes; old schedule, 39 minutes; new schedule, 48 minutes The running time when horses were the motive power averaged about six miles an hour, including stops.

Cable Company Pleads Not Guilty.

The Metropolitan Traction Company, of New York City, has pleaded not guilty to the indictment charging it with manslaughter by causing the death of Mrs. Elizabeth H. Andrews on Feb. 7, last. Mrs. Andrews was struck by a grip car and her death followed the injuries which she received. It was asserted that the accident was due to the carelessness of a gripman, and the son of the unfortunate woman brought the complaint before the Grand Jury. The day of the trial has not been fixed.

Heilmann Electric Locomotive.

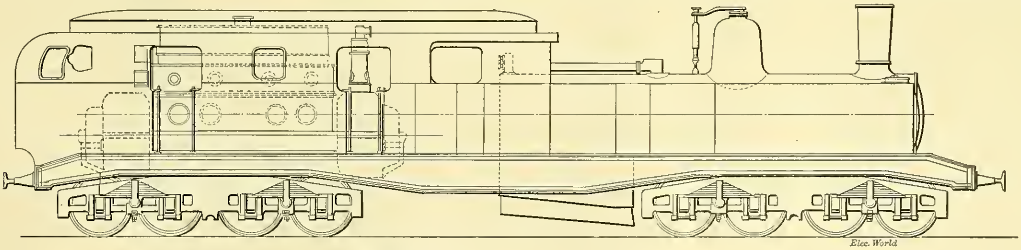
M. Heilmann's bold experiment with his electric locomotive has evidently resulted favorably. The locomotive, it will be remembered, was designed with boilers, engines, dynamo and motors, all contained in one somewhat ponderous mechanism. It ran first between Havre and Benzeville, and later between Paris and Mantes, attaining a speed of 50 miles an hour. This would probably have been exceeded had the government permission to put the machine to its utmost been first secured.

The Chemin de fer de l'Ouest, shortly after the successful experiment with "La Fusee," as the first combination was named, ordered two new locomotives. These are approaching completion, and will probably be shortly put into service on the Dieppe or Trouville branches. They were to have been constructed by the firm of Cail & Cie, and although somewhat similar in appearance to "La Fusee" differ from it in many important particulars. Especial attention has been given to the improvement of details and to the elimination of faults which the first locomotive developed, and great things are predicted for the new engines.

They will each have a capacity of 1,500 hp, two and one-half times greater than that of the first Heilmann locomotive, and have been designed to handle much heavier trains than those now ordinarily made up at a considerably greater speed. The extreme weight of the locomotive is counted upon to give sufficient traction.

The boiler and firebox are placed in the rear of this locomotive, and the peculiar "back end forward" appearance of the original Heilmann locomotive is repeated. On each side of the huge boiler are two side receptacles capable of containing 2,500 gallons of water and six tons of coal.

The same system is followed as in the original locomotive. The steam is brought to a vertical engine to which two dynamos are directly connected, and these latter are excited by a small generator, which also furnishes the current for the illumination of the train. The powerful motors are of the gearless type, and will be a considerable improvement upon those first experimented with. The switchboard stands in front of the driver, who has under his hand the different controlling and braking levers and handles. The whole of this compact railway central station will be housed in on all sides and the front will be sloped off to each side to give the locomotive a cutting force upon the air and thus diminish its resistance.


Elec. World

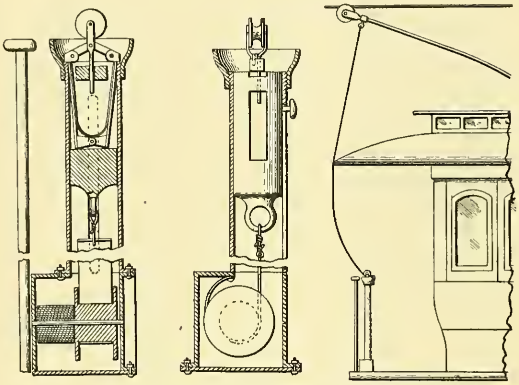
HEILMANN ELECTRIC LOCOMOTIVE.

The locomotive is mounted upon two bogie trucks each having four axles; upon each of these one of the motors has been suspended.

Trial runs of these new machines have demonstrated their easy starting capability and the absence of the rolling and pounding motion of the steam locomotive. The experiment is being watched with keen interest by the railway companies in France.

Trolley Pole Restrainer.

A patent has been granted to Frank Wheeler, of Meriden, Conn., for a trolley car attachment, which we illustrate, whose object is to prevent damage when the trolley wheel leaves the conducting wire. As is well known, when the trolley jumps the wire, the pole spring causes the trolley to move past and above the wire. Owing to the fact that the trolley cord has considerable slack in order to allow it to meet variations in height of the wire above the ground, the pole often flies upward to such a distance that damage to the supports of the trolley wire or other overhead work results. The object of Mr. Wheeler's invention is the production of a simple attachment which will be quickly and certainly operated automatically to pull down the trolley pole as soon as the trolley wheel leaves the wire.


TROLLEY POLE RESTRAINER.

On the car platform close to the dashboard is a vertical tube, shown in part of its length in the illustrations, which contains a spring and trip mechanism. This tube has a slot in one side with an enlargement at the lower end containing a spring and a drum or reel mounted on a spindle having bearings in the wall of the casing. The drum has a strip or chain secured to it and connected at its other end to a piston-like head or block which slides freely in the tube.

The drum spindle has a strength and power in excess of the spring ordinarily used to keep the trolley in contact with the conducting wire, and is connected to the casing and the spindle so as to cause the drum to exert a constant downward pull. In the sliding block is a recess in the lower part of which two pawls are pivoted, the upper ends of which are adapted to hook over the upper end of the tube. The pawls are pressed apart by a spring, as shown, and the upper ends connected with two links, which in turn are pivoted together and to a movable pin, which carries a pulley to which the trolley cord is attached.

The action of the apparatus is as follows: If the trolley leaves the conducting wire the cord is pulled taut by the action of the pawl spring and this disengages the pawls from the shoulder or top; the spring at the bottom is now free to operate and the head is immediately pulled down. The trolley is given double the amount of motion of the head, owing to the pulley acting on the double cord, so that if the downpull of the cord is 18 inches the downpull of the trolley will be three feet.

Comments and Views of Contemporaries.

Trolley Freight Lines.—A project is on foot in Philadelphia to utilize street railways for carrying freight as well as passengers. The plan proposed is a combination of the express business and the parcel delivery. Bundles and parcels of every description brought to stations established for the purpose are to be forwarded to other stations at a uniform charge for each piece, size and weight being within specified limits. * * * Those who have given attention to the subject expect the plan proposed to prove feasible and profitable, and, no doubt, a place will be found for this mode of freight carrying, at least between the populous centres of cities and the outlying districts reached by suburban lines. The service presents no greater difficulties than are involved in the trolley postal car now successfully used in St. Louis and Brooklyn, and about to go into operation in New York, Boston and Chicago.—*Baltimore Herald.*

Proposed Egyptian Road.—The proposed trolley road from Cairo to the Pyramids may seem a distressing innovation to certain old-fashioned people. But your personally conducted tourist must be expected nowadays to demand rapid transit in his sight-seeing; and all that can be done is to insist that the operators of the road be made to pay a handsome percentage of gross receipts for disfiguring the chaste simplicity of the desert with their poles and wires, to provide fenders for the convenient and safe collection of specimens of the natives en route, and to furnish transfer tickets so that passengers may take a side trip to the Sphinx on one fare.—*Rutland (Vt.) Herald.*

Competition with Steam Lines.—When steam roads were first put in operation the promoters of them, like their successors of to-day, did not stop a great while to consider whether or not they were going to injure the business of the men who were running stage lines over the old turnpikes. It is simply a case of the survival of the fittest, even in great metropolitan Sunday papers. What the public wants it is going to have, and the devil take the hindmost.—*Hartford Journal.*

Street Sprinkling.—Dust and its evil effects are things for which the street railways are directly responsible, and they ought to be compelled to right the wrong by keeping the streets well sprinkled. Probably it is idle to expect such fairness and readiness to please on the part of the street railways, but the city government should take the matter in hand and use all its power to force the companies which have created a grievous dust nuisance to abate it at once.—*Cleveland Leader.*

Electric Roads Needed.—It is easy to understand why the managers and stockholders of the steam lines do not wish to have the same privileges accorded the electric roads which the former now possess, as it might make considerable difference in the amount of their dividends. But that is no reason why the public should not have all the advantages which the managers of the electric roads are willing to give them.—*Hartford Journal.*

Cause of Accidents.—People are proverbially thoughtless, and they will continue to get under the wheels of the cars, and every possible precaution must be taken to prevent them from doing so.—*Brooklyn Standard-Union.*

Notes from Foreign Papers.

German papers state that the construction of an accumulator road from Hagen to Eckesey will soon be begun, and that the line will be in operation during the summer. Other similar roads are under consideration.

In the April 12 issue of the *Electrical Engineer*, of London, Mr. Smith has an article on "Some Methods of Collecting the Energy in Electric Railways and Tramways." The subject is treated chronologically and only those devices which have been or are now in use are described.

The London *Electrical Engineer*, in its issue of April 12, contains an article by Mr. Scott on the subject of "Mountain Climbing Railways." Rack railways are considered and information about existing rates, chiefly in Switzerland, is given.

In its issue of April 4, the *Elektrotechnischer Anzeiger* states that Siemens & Halske have been experimenting with the Lachmann conduit system and are now about to construct a road of some length. The cost of construction, it is stated, is no greater than that of the overhead system of this country.

L'Elettricista states that a new line of electric railways will be opened in Rome during the present year. The power will be furnished from the Tivoli-Rome alternating current transmission plant by means of a Shuckert rotary convertor, which is a continuous current dynamo, having both an ordinary commutator and two collecting rings connected to two opposite points of the armature winding.

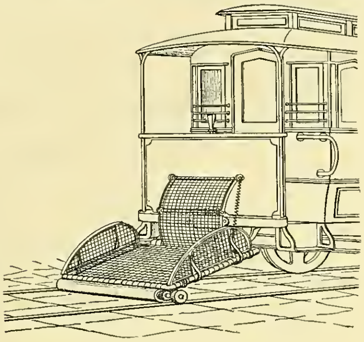
The *Elektrotechnischer Anzeiger* contains a communication from the promoters of the storage battery traction system which has been experimentally introduced in Hagen and Vienna, stating that recent articles describing the system as a failure are wholly without foundation. They claim that the results show that accumulator traction is entirely practicable. The alkaline accumulator is used on the line.

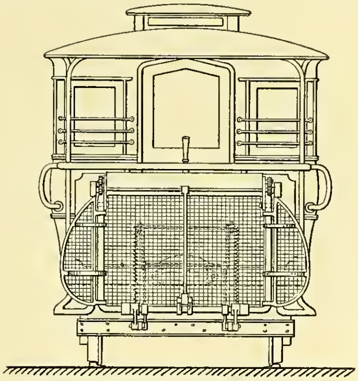
L'Electricien of April 6, states that the motive power of a railway, near Paris, two miles and one-half in length, is to be changed from steam to electricity. This will be the first steam railway in France on which the substitution will be made. Trains of eight and ten cars will be operated, drawn by electric locomotives. They will be able to attain a maximum speed of 54 miles an hour. The current will be carried by a central rail laid on the sleepers. The contact will be made by a sliding shoe.

In the bulletin of the "Societe des Ingenieurs Civils" appears a paper by Mr. Babois, on the "Comparative Efficiency of Electrical and Compressed Air Traction." He criticises a recent paper read before the society by Mr. de Marchena, whose estimates for the efficiencies of electric traction, he believes, were too high, while those for compressed air traction were much too low. The results, he claims, do not correspond to the figures obtained in actual practice. The author favors compressed air traction.

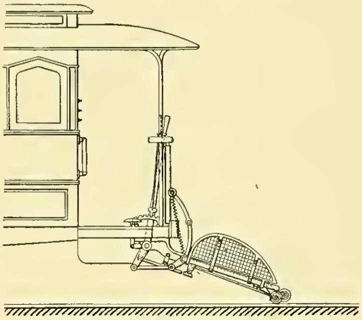
The Lord Fender.

The accompanying cuts represent a fender for street railway cars which, it is claimed, affords actual protection for life and limb. The framework is constructed of galvanized iron tubing, and galvanized iron wire is used for the tightly drawn network. The tubing for the frame of the main body of the fender is 1¼ inches in diameter,—or stronger, if deemed necessary,—and that for the side frames is three-quarters of an inch in diameter. The latter are supported by springs which may be changed so that the sides may be adjusted at any desired angle. When the fender is released from the dashboard and assumes its position in front of the car, the sides adjust themselves automatically. At the front end of the fender is attached a rubber roller 3 inches in diameter,—or larger, if practicable,—which may be made of pneumatic rubber tubing, of solid rubber or of some kind of light wood covered with rubber. The roller is connected by gear with two small substantial iron wheels 3¼ inches in diameter, having rubber tires or bands of sufficient width and thickness. The shields that protect the wheels and gear and prevent persons from coming in contact with them, are omitted in the engravings, in order that the device may be shown more clearly. Roller and wheels are attached to a flexible joint connecting by a rod with a lever conveniently placed on the platform for operating the fender. At the back of the fender frame are attached two curved pieces of spring steel three inches wide and three-eighths of an inch in thickness, and of the required length. Their ends enter sockets of jointed rods or arms, connected with a tumbler shaft which the lever controls. An automatic guard which is provided, if desired, preventing injury from the dashboard or drawbar, is made of the same material as the fender, small rollers being used to prevent the chafing of the dashboard.


FENDER IN POSITION.


FENDER FOLDED.

In its normal position the fender rides at a sufficient distance from the rails so that it does not touch them when the car rocks. The adjustment for this distance is made by the jointed rods or arms. When necessary, as in the case of a person prostrate on the track, the roller can be firmly pressed down upon the rails by a slight movement of the lever. The roller is then caused to revolve toward the car, so that it tends to roll and carry a person coming in contact with it upon the fender, avoiding the probability of catching clothing or dragging the victim under the fender of the car as has so often been the case. The same result will follow when any weight is thrown upon the net. The fender can be raised by the lever to any angle necessary to prevent a person from falling off after he has once been caught upon it, and also to pass over any obstruction on the track. In case a person is thrown violently against either side of the fender, the springs will yield sufficiently so that no injury will be inflicted, but at the same time the sides will hold a person upon the fender.


SIDE VIEW OF FENDER.

When the fender is not in use or needed it can be drawn up closely to the dashboard as shown in the illustration, and is detachable, so that only one equipment is required for each car. A simple device is provided for quick release by the foot in case of an emergency. The springs which support the sides are under tension when the fender is folded, so that when the lever is unlatched it falls immediately into position. The lever and quadrant are interchangeable, so that only one set is needed for each car. A counterbalanced sheet iron shield, not shown in the cut, is attached to the tops of the dashboard to protect the rubber roller from the weather when the fender is folded, thus adding to neatness. It is claimed for this fender that its simplicity is such that it can be made and adapted to any car for a comparatively small sum, and that it is neat, strong, compact and serviceable. The inventor is C. B. Lord, of Astoria, L. I.

FINANCIAL NOTES.

ALLEY L, CHICAGO.—Reports regarding the traffic of the Alley L road are highly encouraging to the stockholders of that company. The business of the road has been steadily increasing since the first of the year, and there have been several days recently when the 50,000 mark was touched. It is said that the average for the month will be close to 45,000. This is a gain of about 6,000 a day as compared with the same month in 1894.

EARNINGS OF THE BOSTON & LYNN RAILWAY.—During the month of March the gross earnings of the Boston & Lynn Street Railway Company were $89 470. This was an increase of $4 490 over the previous year. The expenses were $60,472 for March, 1895, and $62,767 for March, 1894. The number of passengers carried by the company in March was 1,676,307, against 1,551,331 for March, 1894. The car mileage for the quarter this year was 370,119, and last year 367,727.

REPORT OF THE GENERAL ELECTRIC COMPANY.—The annual report of the General Electric Company for the year ended Jan. 31, 1895, was made public this week The business of the year amounted to $13,263,611.58 The cost of the goods, expenses and taxes aggregated $11,451,863.98, making the gross profit $1,811,747.60. Against this amount there is charged off $932,521.55 for interest on debentures, various old losses, cost of patents and franchises and depreciation of inventories and sundry losses. The total loss on old accounts, as now estimated, is $15 209,359.69, which is reduced by the net profit of the present year. The company has charged $2,000,000 to the profit and loss account to cover estimated loss in the liquidation of old business. With regard to the year that is covered by the report, it is stated that the output of the various factories at cost value was only slightly below that of the previous year. The output in the amount of material produced was considerably in excess of the previous year. The expectations of the directors expressed in the last report that they could, out of the then unliquidated assets, pay off the balance of the floating debt and provide all necessary working capital, have been realized. In addition, the company has purchased $1,250,000 of its debentures.

NEW INCORPORATIONS.

TOLEDO. O.—The Toledo Traction Company has been incorporated with a capital stock of $4,000 000. The promoters are Albion E. Lang, Chas. L. Wright, Winfield S. Jewell, Edgar H. Eckert.

CHICAGO, ILL.—The Metropolitan Electric Street Railway Company has been incorporated. The capital stock is $5 000 000. The promoters are Robt. P. Parker, Richard E. Breed and Jas. F. Dagley.

GREENSBURG, PA.—The Monongahela Traction Company has been incorporated with a capital stock of $5,000. The incorporators are Alan D. Woods, John F. Davitt, L. G. Woods, Richard Fickling and John Harper Adams

CLEVELAND, O.—The Cleveland, Painesville & Eastern Railway Company has been incorporated, capital stock $250,000. Those interested in the enterprise are Henry A. Everett, Julius E. French, J. A. Beidler, Edward W. Moore.

GRAFTON, W. VA—The Grafton Traction Company has been incorporated with a capital stock of $150,000, to construct and operate an electric street railway from Grafton, W. Va., to Pruntytown, etc The promoters are F. A Morlan, H. M. Sommerville, E. M. Morlan, Grafton, W. Va.

SULPHUR SPRINGS, PA.—The Edgwood & Sulphur Springs Passenger Railway Company has been incorporated with a capital stock of $10 000. The line is to extend from Market street and Southern avenue, South Williamsport, to Sulphur Springs, Lycoming County, one and one-half miles.

HOBART, IND.—The Hobart & Western Electric Railway Company has been incorporated with a capital stock of $50,000, to construct and operate a street railway in Hobart, Lake County. Those interested in the project are Alfred Morrison, Andrew J. Smith and George Stocker, of Hobart.

NORWOOD, PA.—The Warwick Street Railway Company, capital $50,000, has been incorporated. Isaac H. Rhoads, Eli B. Hallowell, Harry Collins, I. Mortimer West, Jr., and Henry Delaplaine are the directors. The line is to run from the western boundary of Norwood, Delaware County, through Glenoldeni and Sharon Hill.

WADSWORTH OHIO.—The Wadsworth Electric Railway Company has been incorporated by L. G. McCauley, W. A. Ault, J. S. Oberholzer, O. V. Dibble, B. F. Weaver, Frank Mills, W. S. Holloway, Eli Oberholt, M. C. Lytle and R O. Hibedel. The company proposes to build electric railways in Cuyahoga, Medina and Wayne counties. The capital stock is $10,000

NEWS OF THE WEEK.

OCEAN VIEW, VA.—An electric railway is to be built at a cost of $250,000.

MANCHESTER, N. H.—Soulle, Dillingham & Co. are pushing forward the electric road.

PORTSMOUTH, VA.—An electric railway is to be constructed from Portsmouth to Port Norfolk.

NASHUA, N. H.—Work on the track of the electric railway will be at once commenced in Hudson.

HARRISBURG, PA.—The Senate has voted against the Penrose bill limiting the hours of labor for motormen.

CARTHAGE, N. Y—Steps are being taken to build an electric road from this company to Copenhagen, a distance of eight miles.

TOWANDA, PA.—The Towanda Traction Company has been granted an extension of three months in which to complete its road.

PIKEVILLE, MD.—The Pikesville, Reistertown & Emory Grove Electric Company expect to have their line complete about May 1.

BAY SHORE, L. I., N.Y.—The Brentwood Trolley Railway Company has been granted a franchise to construct their line through this place.

DENVER, COL.—The Denver Consolidated Traction Company has reduced the wages of its conductors and motormen to 20 cents an hour.

DETROIT, MICH.—Eighty employees of the Detroit Railway Company struck last week because their wages were not increased from $1.25 to $1.50 a day.

FLINT, MICH.—John A. Nolan, of Saginaw, has been granted an electric railway franchise. Two miles of road must be in operation within 12 months.

LOCKPORT N. Y.—Charles A. Johnson, of New York, who is the projector of the electric road to Olcott, states that the improvement will certainly be made.

BINGHAMTON, N. Y.—The Binghamton, Lestershire & Union Railway Company will extend its line. Address Manager J. E Clark for detailed information.

NEW HAVEN, CONN.—The New Haven Street Railway Company has applied for permission to extend its line on Townsend avenue from Four Corners to Morris Cove.

ST LOUIS, MO—It is stated that over 50 miles of new tracks are to be laid in St Louis during the present year. These include new lines, extensions and improvements.

BOSTON, MASS.—Eight electric cars for the mail service to be organized on the West End Street Railway Company are well under way and will soon be put into service.

DANVILLE, PA.—The ordinance granting the North Susquehanna Transit Company a franchise through the city of Danville has been defeated in the borough Council.

JAMAICA, L. I.—The trustees of Jamaica village have granted the Long Island Electric Railway Company an extension of a month for the construction of the road in the village.

SUSQUEHANNA, N. Y.—The construction of an electric railway between this place and Lanesboro is contemplated. Address the clerk of the Council for detailed information.

BRATTLEBORO, MASS.—The contract for the building of the electric railway has been let to Young Cooledge. It seems probable that the road will be in full operation by midsummer.

WAUKESHA, WIS.—The representatives of the proposed new electric railway line between Waukesha and Milwaukee state that nearly all the options for right of way have been secured.

OSWEGO, N. Y.—F. A. Emerick, receiver of the Oswego Street Railway Company, has assumed charge of the property. Charles S. Barrett has been appointed general manager of the company.

GRAND HAVEN, MICH.—Work has been begun on the street railway in Grand Haven. It will extend to Highland Park, a distance of one and one-half miles, and will be operated by a steam motor.

MUNCY, PA.—It is reported that an electric railway, nine miles in length, is to be built between this place, Hughesville and Picture Rocks. Senator J. Coyle, Charles Drumm and C O. Smith are interested.

INDIANAPOLIS, IND.—The Noble street line of the Citizens' Street Railway Company is to be extended to Keystone avenue. The company will lay girder rails 100 feet long and weighing 90 pounds to the yard.

SPENCER, MASS.—The Warren, Brookfield & Spencer Railway Company has petitioned for a franchise for right of way through the streets of this town. R. L. Courier and C O. Richardson are among the directors.

CORNISH, ME.—An electric railway is projected from this place to Porter via Parsonfield, and Hiram J. D Merrill, Parsonfield; W D. Churchill, of this place, and E H. Bert, of Boston, are among the projectors.

PIERMONT, N. Y.—The Nyack Traction Company has petitioned for permission to construct, operate and maintain an electric street railway through this village. C. H. Kane, town clerk, can furnish further details.

SOUTH FRAMINGHAM, MASS.—The first trip over the South Middlesex Electric Railway took place on April 26 The occasion was celebrated by the residents of the city and fireworks were set off in the evening.

BROOKLYN, N. Y.—Judge Osborne has granted an injunction restraining Commissioners White and Welles from interfering with the construction of the Nassau Electric road on South Fifth and South Eighth streets.

TROY, N Y.—The Troy City Railway Company has made application to the State Board of Railway Commissioners for permission to change the motive power of the line from Troy to Cohoes from horses to electricity.

LIGONIER, PA.—It is reported that the Pittsburgh, Greensburg & Latrobe Electric Railway will build a branch line from Latrobe to this place. The general manager of the company can be addressed for detailed information.

WASHINGTON, D. C.—The Washington, Alexandria & Mount Vernon Electric Railway Company has asked permission to complete its lines into Washington. The road is now in operation from Mount Vernon to North Alexandria.

NORFOLK, VA.—It is reported that the Norfolk & Ocean View Electric Road is to be extended from this place to Willoughby Spit, opposite Old Point Comfort. W. A. Young, H. L. Page and H. L. Smith are among those interested.

KINGSTON, N. Y.—The Rondout & Eddyville Railway Company has applied for permission to construct, operate and maintain an electric railway through this city. City Clerk August Schepmes can be addressed for further information.

BROOKLYN, N.Y.—At the last meeting of the Board of Supervisors a communication was read from County Treasurer Adams, stating that he had already expended $190,000 in liquidating claims incurred during the street railway strike.

NEW YORK, N. Y.—The Flushing & College Point Electric Railway Company has been sold to Cravath & Houston, representing the reorganized company, for $25,000. The new company will operate the road and improve its facilities.

TAUNTON, MASS.—The Street Railway Company last week posted a notice in its car barns stating that after May 6 the pay of motormen and conductors would be increased to $1.75 per day, in accordance with a petition made some months ago.

PHILADELPHIA, PA.—The Electric Traction Company has recently made a test of a number of fenders. Among those tested were the Crawford and Standard fenders and those of Dr. A. J. Marsten, T. W. Johnston, S. Howel Evans, of Philadelphia.

NEW BRIGHTON, S I.—The State Railway Commissioners have granted the application of the Staten Island & Midland Railway Company to build an electric trolley road from the Richmond turnpike and Clove road to Oak street and the Richmond road.

PHILADELPHIA, PA.—The following officers of the Delaware County & Philadelphia Electric Railway Company have been elected: President, James S. Austin; vice-president, Edward V. Kane; treasurer, W. Henry Sayen, and secretary, Samuel Haigh.

DANVILLE, ILL.—W. S. Matthias has been granted a franchise for an electric road from Danville to the Iroquois county line. The road will pass through Bismarck, Rossville and Hoopestown. The company proposes to lay out a summer resort at Alban Lake.

PHILADELPHIA, PA.—Judge Dallas last week heard arguments in the suit of the Johnson Company against the Pennsylvania Steel Company, brought to enjoin the defendant from making a street railway switch alleged to be an infringement of the plaintiff's patent.

PHILADELPHIA, PA.—An official of the Lehigh Valley Traction Company has denied the report that the company will equip a four-mile branch of the road at Perth Amboy, N. J., and that in a short time all the shorter branches will be equipped for electrical operation.

POTTSTOWN, PA.—The Norristown & Perkiomen Creek Railway Company has secured the right of way on the turnpike between Perkiomen Bridge and Norristown. This is a part of the route between Philadelphia and Reading. It is stipulated that the work is to be finished in three months.

NEW ORLEANS, LA.—Work has been begun on transforming the Orleans Railway into an electric line. It is hoped that the work will be completed in three or four months. Every effort will be made to finish the work as soon as possible, as the railway has seriously felt the competition of electric lines.

NEW ORLEANS, LA.—The Supreme Court of Louisiana has decided that the injunction against the State Board of Arbitration obtained by the several street railway companies of New Orleans, restraining the board from considering a controversy between the companies and their employees, should be vacated.

WEST CHESTER, PA.—Castle Rock, a well-known romantic and historic spot, eight miles east of West Chester, on the line of Philadelphia & West Chester Electric Railway, has been purchased from C. M. Taylor, for $500 per acre. The company is the buyer. The grounds are to be made an excursion resort.

BUFFALO, N. Y.—The Buffalo & Gardenville Electric Railway Company is to be formed, with a capital stock of $40,000, to connect Gardenville and Ebenezer. The road will be double tracked, and it is stated that construction will be begun as soon as possible so that a part of this season's traffic may be secured.

ALBANY, N. Y.—The Hamilton Rapid Transit bill for New York City has been signed by the Governor. This is the bill which appropriates $5 000 000 extra for building the rapid transit road in New York, and also contains amendments to the Rapid Transit act adding to the powers of the commission.

ALLENTOWN, PA.—A suit has been commenced by the borough against the Allentown & Lehigh Valley Traction Company, asking that a permanent injunction be granted restraining the company from operating its tracks in South Bethlehem, until all the provisions of the borough ordinance are complied with.

NORTH HEMPSTEAD, N. Y.—An application for a franchise to construct and operate an electric surface road connecting the villages of Roslyn, Port Washington and Great Neck will shortly be made to the joint board of town officers and highway commissioners. Good men and plenty of capital are behind the enterprise.

NEW BRIGHTON, S I.—An injunction has been granted enjoining the Staten Island Electric Railway Company from constructing its road at Sailors' Snug Harbor, New Brighton. The trustees claim that the operation of the cars in front of the institution would be dangerous in view of the fact that the inmates are old and decrepit.

RYE, N. Y.—The New York, Westchester & Connecticut Traction Company has applied for a charter to construct, maintain and operate an electric road between the points named. Right of way through this town has been also applied for. Charles Brennecke, Commissioner of Highways, can be addressed for further information.

LOCK HAVEN, PA.—It is stated that an electric line from Philadelphia, passing through the Rest Branch Valley, and extending beyond Loch Haven as far as the soft coal regions, is projected. One of the projectors is quoted as stating that the road would carry not only passengers, but freight, and thus could be made profitable.

BROOKLYN, N. Y.—The civil service commissioners have ordered an examination for the trolley inspectors, whose appointment was recently authorized by the Board of Aldermen. The latter claims that as the appointees have to furnish bonds, they come under the class of confidential appointments, and no examination is necessary.

CHICAGO, ILL.—In answer to the allegations contained in the bill of Mr. Ziegler, for a receiver for the Lake Street Elevated Railway Company, it is stated officially that there will be no lease made of the Lake Street road to the Northwestern Company in consideration of the guarantee made by the latter of the Lake Street road's bonds.

MEDIA, PA.—The Boards of Council of both Lansdowne and Clifton Heights have adopted resolutions refusing to grant additional privileges to the Philadelphia & Delaware County Electric Railway until it paves Baltimore avenue, as provided in the original ordinance. The company has recently made petitions for turn-outs and extra tracks.

PORTLAND, ME.—The work of constructing the new electric railway is under way. Work was begun at the Union station. The new power house will be one story in height, and its dimensions will be 105 feet 4 inches by 113 feet 4 inches. The smokestack will be 140 feet in height. The building will be brick, and the foundations will rest upon 627 piles.

NEW BRITAIN, CONN.—It is not known at the present time just what the plans of the Central Railway & Electric Company now are, in view of the fact that the railway company has decided to report adversely on its petition to construct a line to Hartford. It seems to be generally believed, however, that the line will be extended to Hartford some time this year.

ANDERSON, IND.—The Clodfeller Electric Railway Company has been reorganized with $500,000 capital stock. Among those interested are J. D. Lindsay and A. B. Wilson, Jr., of New York, and N. J. Clodfeller. The contract for the construction and equiqment of the line from Marcen to Anderson has been awarded to the New York Standard Construction Company.

CHICAGO, ILL.—Workmen who were employed in track construction in the northwest part of the city struck for an advance of 25 cents in their pay last week. Some of the men, however, decided to return to work when the contractors refused to grant the advance, and a fight was brought about. Five of the men were arrested and were fined $5 in the police court.

ROME, N.Y.—The General Compressed Air Company recently made a proposition to the citizens of Rome that the manufacture of the Hardie Compressed Air Motors would be located in Rome if a sufficient amount of stock was subscribed for. The subscription has been made, and the contract for the manufacture is to be made with the Rome Locomotive & Machine Works.

BROOKLYN, N. Y.—At the annual meeting of the Atlantic Avenue Railway Company the following officers were elected: President, Benjamin Norton; vice-president, John T. Ilsey; secretary and treasurer, Benjamin Frick. A committee was appointed to draft suitable resolutions on the death of William J. Richardson, who was connected with the company for many years.

NEW YORK, N. Y.—Comptroller Fitch has sold the franchise for an extension of the Lexington avenue & Pavonia Ferry Company from Lexington avenue and 96th street to First avenue and East 93d street to Avenue A to the ferry, to John D. Crimmins, of the Metropolitan Traction Company. The price bid was 3½ per cent. of the gross receipts for the first three years and 5 per cent thereafter.

SPRINGFIELD, O.—H. L. Canfield, of Xenia, is interested in an electric railway to be constructed from Springfield to Jamestown by the way of Clifton and Cedarville. Mr. Canfield states that 11 out of 18 miles of right of way have been secured. The water power at Clifton will be utilized for power. It is announced that if the entire right of way is secured work will be commenced at once.

NEW YORK, N. Y.—The Metropolitan Traction Company has obtained permission to cable the 23d street cross-town line and to use the underground trolley system on the Lenox avenue extension of the Sixth avenue line, from 106th street to the Harlem River, and along 106th street to a connection with the Lexington and Columbus avenue cable systems. This latter application was opposed by the Third Avenue Railroad Company.

PHILADELPHIA, PA.—The cable power stations at Ninth and Sansom streets and 23d street and Columbia avenue were shut down this week permanently, as the Philadelphia Traction Company has equipped its cable lines for electrical operation. A number of men employed at the stations will be thrown out of employment, but half of the station force, perhaps, will probably be given work at the car barns as mechanics.

POTTSVILLE, PA.—The Schuylkill Electric Railway Company has taken charge of the mails between Pottsville and Minersville. Heretofore two mails each day was the schedule made by horse and wagon to and from these towns. It took one hour to make the trip, and then frequent delays made it unreliable. Now the electric railway will carry three mails each way daily. Both towns are loudly commending the excellent improvement in the system, and it is only a question of time when the whole west end and other towns that cannot be reached by steam railway will be receiving their mail by the electric system.

PHILADELPHIA, PA.—Samuel Hart & Son have commenced work on the Philadelphia Traction Company's new car house on the east side of 16th street, between Porter and Wolf. The depot, or, more properly, car barn, will be 400 feet long and about 80 feet wide. The same firm has also begun work on an extension to the Ridge avenue car depot. The lot on the west side of 32d street, extending from Susquehanna avenue to Dauphin street, 140 by 500 feet, will be covered by a new car barn for the accommodation of the Columbia avenue trolley line, which is to reach the new depot on 31st and 32d streets. When this work is completed, the Ridge avenue car barn will be the largest in the world. It will cover the block bounded by 31st and 32d streets, Susquehanna avenue and Dauphin street, and excepting a small corner cut off by Ridge avenue, will be 400 by 530 feet. Both of these new car houses will be constructed of brick, with roofs supported by trusses of iron and wood.

PERSONAL.

MR. L. E. MEYRS, of the Electric Installation Company, of Chicago, was in New York this week.

MR. THOMAS LOWRY, president of the Twin City Rapid Transit Company, of Minneapolis and St. Paul, arrived in New York from his European trip last Saturday.

TRADE NOTES.

THE BERLIN IRON BRIDGE COMPANY, of East Berlin, Conn., is putting up an iron bridge at Thomaston, Conn., consisting of two plate girder spans, each 60 feet long, with a roadway 22 feet wide and two sidewalks, each 6 feet wide. The bridge will be made entirely of iron and concrete, no woodwork being used in the construction.

EDWARD F. KEATING, of New York, is meeting with great success in selling the Brownley injector. It is low-priced and, being without valves of any kind, it is not apt to get out of order, and it is easier to operate. It can be used under high or low pressure, some of the tests showing that it has worked successfully under a pressure up to 350 pounds. Again, the injector will work under hot water. This claim is surprising, but it is vouched for.

THE BOUDREAUX DYNAMO BRUSH COMPANY, of Chicago and New York, manufacturers of improved dynamo brushes, is actively developing a device by which its brushes will work without possibility of failure on reversible motors. The experiments made thus far have shown that the use of Boudreaux anti-friction metal will be a great improvement. The company hope to report in the near future the definite result of the experiments now in progress.

JAMES G. BIDDLE, formerly manager of Queen & Co., Philadelphia, has opened an office at 525 Drexel Building in that city, and will deal in scientific and electrical apparatus, while also representing as agent several manufacturers. Mr. Biddle will be sole American agent of Elliott Bros., of London, celebrated the world over for the manufacture of scientific instruments, and in addition will handle, as special agent, the measuring instruments of the Weston Electrical Instrument Company, of Newark, N. J. Mr. Biddle, as representative of the Electric Storage Battery Company, is pushing the chloride accumulator for college and laboratory work.

THE FOREST CITY ELECTRIC WORKS, of Cleveland, O., manufacturers of the well-known roll-drop commutator segments for dynamos and motors, have established an office in New York at 126 Liberty street, which will have general oversight of the eastern territory. Mr. John C Dolph, formerly connected with the Short Electric Railway Company, and for the past two years eastern representative of the Eureka Tempered Copper Company, has been appointed manager of this district. It is the policy of the company to push vigorously the sale of its products in eastern territory. A large stock of standard street railway and lighting segments will be carried in the New York storeroom.

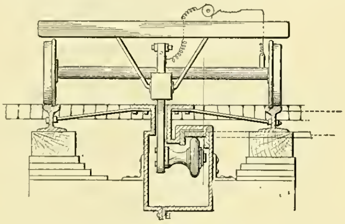
Record of Street Railway Patents.

UNITED STATES PATENTS ISSUED APRIL 23, 1895.

537,857. ELECTRIC MOTOR CAR; William Robinson, Boston, Mass. Original application filed April 12, 1889. Divided and this application filed Jan. 16 1890. The motor has one end journaled to the axle, and the other end is supported flexibly by an independent bar or device, which is partly supported by the motor journal boxes, and partly, directly or indirectly, by another axle, independently of the truck frame and of the ordinary axle boxes.

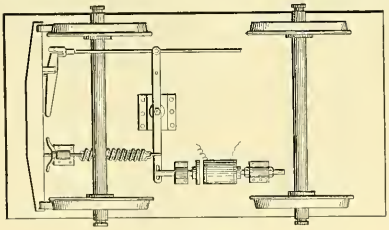
537,929. LIFE GUARD FOR CARS; Henry Mills, Brooklyn, N. Y., assignor to Thomas Adams, Jr., same place. Filed Feb 13, 1894. The supporting mechanism is wholly disconnected from the fender but adapted to engage therewith to hold the same in an elevated position. There is a front cross-bar on the fender, and to it a trigger is pivotally connected, there being a connection between the trigger and the mechanism for holding the fender in an elevated position.

538,005. ELECTRIC RAILWAY; Conrad C. G. Wolpers, Brooklyn, N. Y. Filed Oct. 2, 1894. Fig. 2 reads as follows: "In an underground system for electric railways, a conduit consisting of a sectional metallic framing having connecting bottom flanges, one section having at its upper corner a reverse U-shaped recess, and, laterally thereof, an inwardly-extending shoulder and a vertical wall and a horizontal top flange, the other section having at its upper portion an inwardly-extending shoulder and a vertical wall and a horizontal top flange, braces for bracing the upper and lower portions of said sections, a reverse U-shaped insulator canal or channel located in said recess and having longitudinal side grooves and a main conductor seated in said grooves and having seating against the top of said insulator." (See Illustration.)



No. 538,005.

538,024. ELECTRIC BRAKE; Edward D. Lewis, Savona, N. Y. Filed Dec. 7, 1894. A spring normally holds the brake set, and means are provided for varying the tension of the spring. An electromagnet disposed to normally act in opposition to the said spring releases the brakes and holds them out of action until the circuit is interrupted, means being available for varying or changing the relative position of the electromagnet. (See Illustration.)



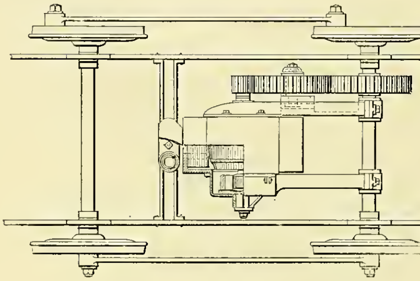
No. 538,024.

538,052. SWITCH-SHIFTER FOR STREET RAILWAYS; Thos. Thompson, Newark, N. J. Filed Oct. 5, 1894. A slide is pivoted transversely to a switch point *c*. A stud is connected with the push bar, having an inclined end. A latch holds the switch point open, and the tread bar with lever adapted is to release the latch.

538,104. ELECTRIC MOTOR FOR RAILWAY CARS; Charles E. Emery, Brooklyn, N. Y. Filed April 19, 1894. An electric motor is supported at one end on the axle and adapted for use under a car by arranging the armature shaft at substantially the same elevation as the car axle. An intermediate idle gear transmits motion from a pinion on the armature shaft to a spur gear on the car axle. The three gears are all supported by suitable framing, journals and bearings in a continuously fixed relation one to the other. (See Illustration.)

538,157. RAILROAD RAIL; James M. Faulkner, Philadelphia, Pa. Filed Oct. 30 1894. The rail has the top extending on both sides of the web. The longitudinal rib on the top to one side of the centre thereof forms the narrow edge flange, and the opposite wide flange and the removable raised tread formed to fit on and interlock with the rib. The narrow flange fits the narrow flange of the rail top, and at the opposite side has the wide flange to fit the wide flange of the rail top to form a depressed tread for vehicle wheels.

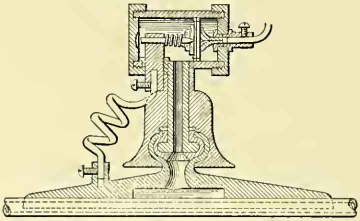
538,158. ELECTRIC RAILWAY SYSTEM; James M. Faulkner, Philadelphia, Pa. Filed Jan. 12, 1895. The system comprises a conduit having exposed conductor sections with depending contact points. A flexible carrier beneath the conductor has depressions therein containing mercury, so that the points enter the mercury when the carrier is moved up. (See Illustration.)



No. 538,104.

538,161. COLLAPSIBLE GATE FOR RAILWAY CARS; William M. Francis and Frederic G. Taylor, Everett, assignors of one half to Philip A. Williams and Helenus E. Farrington, Chelsea Mass. Filed June 7, 1894. The collapsible and extensible gate is composed of vertically movable horizontal bars, with means for raising and lowering the bars to extend or collapse the gate. Devices are operated by one of the horizontal bars to shift the step-guard or fender laterally over the running board or step.

538,179. CAR-FENDER; Thomas O'Brien, Washington, D. C. Filed Jan. 23, 1895. A square shaft is rigidly connected to the upper end of the fender frame. Rollers are mounted at the lower end of the fender frame and crank arms are attached to the shaft, springs being connected at one end to the arms and at the other to the car. A rod rigidly connected to the shaft and a locking bar is pivotally attached to the free end of the rod with means for locking the bar in position. A tripping mechanism carries a cam adapted to engage and tilt the bar.



No. 538,224.

538,199 RAILWAY CROSSING; Monas D. Pratt, Steelton, assignor of one-half to John F. Ostrom, Philadelphia, Pa. Filed Feb 23, 1895. This is the combination with the main rail of girder cross-section, of a guard rail of similar section having its head adjacent to and parallel with the head of the main rail. The guard rail has its head formed with a depression at the side adjacent to the main rail suitable for the passage of wheel flanges, the depression forming a groove which is bounded on the bottom and one side by the guard rail head and on the other side by the head of the main rail.

538,224. AUTOMATIC CUT-OUT SYSTEM; Lewis L. Borradaile, Philadelphia, Pa., assignor of one-half to Joseph C. Borradaile, same place. Filed Feb. 5, 1895. This is the combination of a hollow trolley wire, a pneumatic device in communication therewith, and a current breaking device actuated by the pneumatic device upon rupture of the trolley wire. (See Illustration.)

Street Railway Gazette.

Vol. XII. NEW YORK, MAY 11, 1895. No. 19.

Suburban Traction Company of Orange, N. J.

One of the most interesting street railway systems in the vicinity of New York City is that of the Suburban Traction Company of Orange, N. J. The company operates about ten miles of electric railways extending through the residence and business sections of Orange, East Orange, West Orange and Bloomfield. The company also controls the Eagle Rock line which is essentially a summer railway, the traffic on which, to a very great extent, is that of pleasure seekers induced to ride by the picturesqueness of the scenery on the road and by the resorts which have been provided to attract them. There are to be found in the several lines features of engineering interest which may be studied to advantage.

The lines which extend through the towns are laid with a single track with turn-outs, and are constructed in a very substantial manner. The gauge is 5 feet 2½ inches. A portion of the track is laid with 80-pound girder rail supplied by the Johnson Company, of Johnstown, Pa., and the paving on the streets has been done with Belgian blocks. The trolley wires are supported by iron side poles furnished by Morris, Tasker & Company, of Philadelphia, Pa. General Electric overhead construction is employed throughout. At the present time the company is operating 14 cars, but the number will be increased as soon as the orders can be filled.

The cars now in use were built by the J. G. Brill Company, of Philadelphia, and are mounted on trucks made by the same company. They are handsomely painted and decorated and are equipped with G. E. 800 motors The closed cars are 20 feet in length and the length of the open cars is 22 feet. The Robins fenders are used.

Owing to the fact that many unusually steep grades are found on the line it was deemed necessary to make special provision for brakes in order that accidents might be prevented. First of all, the cars are equipped with the Bonta electric safety brake which was described at length in the Street Railway Gazette of April 20. This braking appliance has given excellent satisfaction since it has been in use. In addition to the ordinary hand brakes, the cars are equipped with powerful toggle joint lever brakes. With this equipment for arresting the motion of cars, the possibility of their becoming uncontrollable on grades is, it is thought, almost entirely overcome.

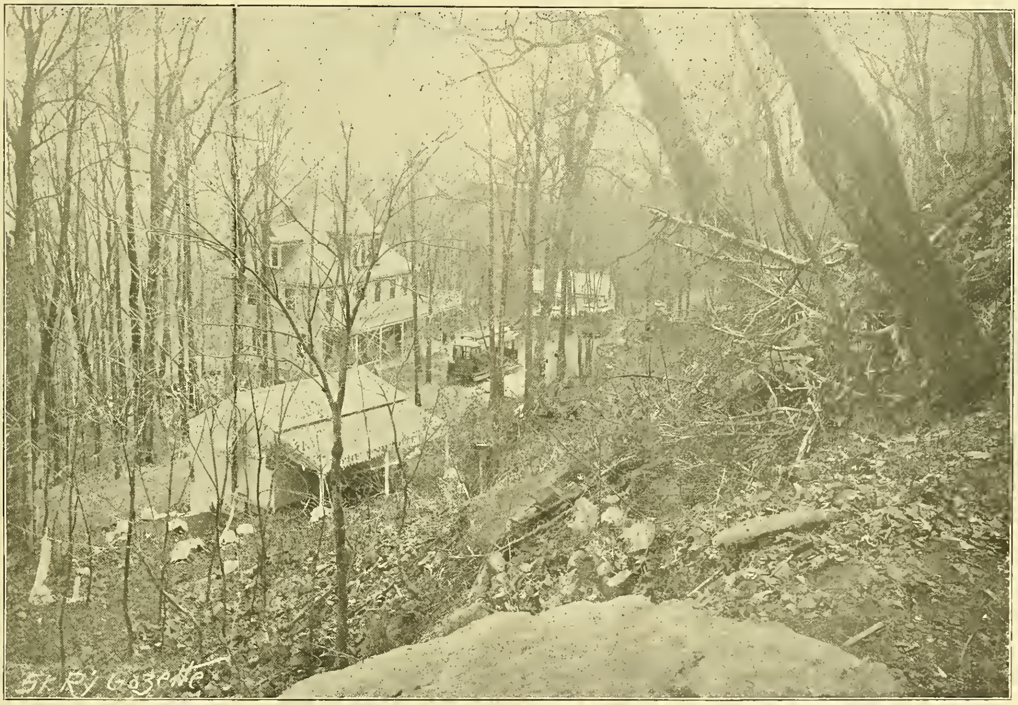


FIG. 1.—TERMINUS OF EAGLE ROCK LINE.

All the cars are equipped with a novel form of sand box shown in Fig. 2, which was designed by F. H. Tidman, superintendent of the road. It is constructed of sheet iron pipe 6 inches in diameter and 4 feet in length, terminating at the lower end in a funnel shaped spout with a one and one-half inch opening. A half-inch rod to which a rubber valve is attached extends through the pipe and has a handle at the top as the cut shows Agitators attached to the rod prevent the sand from packing. The sand box is attached to the cars by means of iron bands riveted to the dashboard. This simple device, which has given entire satisfaction, has cost only $2 for each car.

F. H. TIDMAN.

Perhaps the most interesting part of the system is the line which extends to Eagle Rock, an attractive pleasure resort on the first range of the Orange Mountains about four and one-half miles from the Delaware, Lackawanna & Western Railway depot in Orange. The present terminus of the road is shown in Fig. 1 at the base of the Rock, but the line will shortly be extended to the summit, about 50 feet above. The elevation of the terminal point is about 620 feet and it is reached by several inclines, the grades of which range from 5 to 10 per cent., Fig. 3. There are several curves along the line, the shortest radius being about 45 feet. A view of a reversed curve of 50 feet radius on a 5 per cent. grade is shown in Fig. 4. Every precaution has been taken for the safety of passengers. At all the curves guard rails of extra height and strength are provided. They consist of 45-pound flat tram rails set on edge and bolted to the webs of the T rail, Fig 5. They are braced on the inner side by large wooden blocks bolted to the ties. The provision that is made for braking the cars has already been mentioned. The traffic over this line is extremely heavy during the summer months. Throngs of people are carried from Newark and Jersey City to the Eagle Rock line by the Consolidated Traction Company of New Jersey.

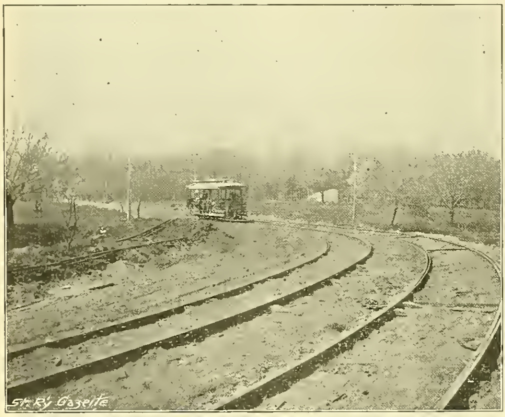


FIG. 5.—FIFTY-FOOT RADIUS CURVE SHOWING GUARD RAILS.

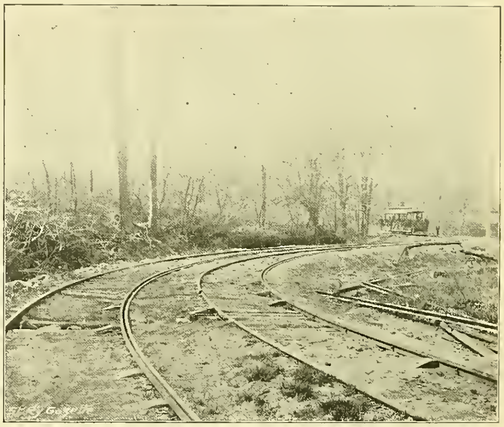


FIG. 4—REVERSE CURVE ON EIGHT PER CENT. GRADE.

The Bloomfield branch, which is at present operated by horses, is being equipped for electric traction and it is expected that motor cars will be in operation in about two weeks. The rails are of the Johnson girder type, weighing 80 pounds to the yard. Special interest attaches to the track construction because of the fact that the rails are connected by the new Brown bond, consisting of a plastic metal compound that makes absolute contact between the rail and the fish plate. The case which is provided to hold the compound in position is a flat piece of moulded cork treated with a viscous compound that does not oxydize or crack and having a circular opening one and one-half inches in diameter. The surfaces to which the cases are to be applied are cleaned by means of a scraper or file and the centres of these spots are rubbed with a special alloy discovered by Mr. Edison. This changes the iron rust instantly into pure metallic iron forming a silver-like deposit which repels water and will not corrode. The manner in which the bond is applied is shown very clearly in Fig. 6. The cork-retaining case is warmed and pressed against the webs of the rails. A plug of the plastic metal is placed in each of the circular openings by means of a tube or plunger, as shown in the engraving. The fish plates are then bolted in place. The tightening of the bolts compresses the cork to one-half of its former thickness and makes the surfaces adhere together, the plastic metal in the centre forming an electrical contact between the ends of the rails and the fish plates. A complete description of this rail bond was given by Mr. Harold P. Brown in an article which appeared in the STREET RAILWAY GAZETTE on March 23.

The power plant is at present located in the station of the Essex County Electric Light Company. It consists of one 150-hp Ball & Wood high speed automatic cut-off engine

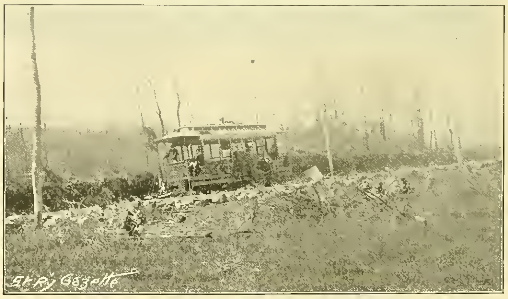


FIG. 3.—TEN PER CENT. GRADE.

belted to a Westinghouse multipolar generator and one General Electric multipolar generator connected by belt to a 100-hp Ball automatic cut-off engine. The plant will shortly be increased by the addition of a 150-hp Westinghouse generator. While the apparatus is owned by the company, steam is furnished at 120 pounds pressure from Morrin Climax boilers owned by the Electric Light Company. Considerable land is owned in West Orange by the Traction Company and it will soon commence the construction of a commodious power house, car barn and offices.

Since Dec. 6 last the road has been under the management of Mr. Watson Whittlesey, as receiver, and by his successful management, the property has been greatly developed and increased in value. The superintendent and electrical engineer of the company is Mr. F. H. Tidman, who has had a wide practical experience in electrical and engineering work.

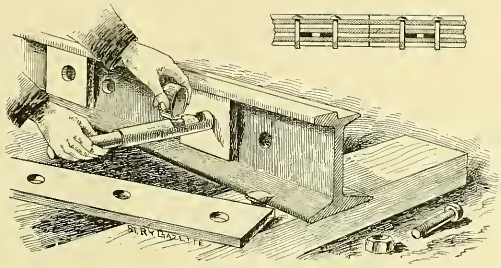


FIG. 6.—APPLYING PLASTIC BOND.

Speed of Trolley Cars.

The Railway Committee of the New York Senate gave a hearing in Albany, last week, on the Wieman bill, fixing the speed of electric cars in Brooklyn at six miles an hour within two miles of the ferries, and at eight miles an hour for the rest of the city. The Brooklyn railway companies which objected to the passage of the bill, were represented by counsel, who showed that all attempts to give rapid transit to the city would be nullified by the passage of the bill. The principal speech was made by S. S. Whitehouse, of the Brooklyn, Bath & West End Street Railway Company. He mentioned the fact that prior to 1892, the surface cars of Brooklyn were operated by horses and that the average speed was eight miles per hour. The people demanded improvements and the companies complied with the demand by installing the trolley system at an expense of millions of dollars for the reconstruction of road bed, purchase of new rolling stock, building of power houses, etc. In granting the companies the privilege of changing their motive power, the local authorities conceded certain privileges as well as imposed obligations. They provided that the companies should run their cars at such speeds as should enable them to furnish the public better and more speedy transit, but not in excess of ten miles an hour. Unless this privilege had been granted there would have been no good reason for the change of motive power. He argued that if the change contemplated by the bill went into effect, it would violate the contract between the city and the railway companies. It would, he believed, vastly inconvenience 300,000 or 400,000 persons who daily traveled on the surface cars It would greatly retard the growth of the city and would make unimproved property far less salable. It would result in a reduction of wages of 5,000 or 6,000 employes of the Brooklyn railways; for a less number of trips would be made daily and the pay, consequently, would be less. The companies certainly could not afford to pay as much for a few trips as for many. At the present time the motormen and conductors received $2 per day, and they earned it by the number of trips they made. If the bill should become a law, the running time would be reduced so as to take a trip off each man's work, and the blow would fall upon the men as well as upon the companies and the traveling public.

Mail Service on Street Railways.

It is interesting to note that while the trolley mail service is rapidly extending on this side of the Atlantic, an experiment in this direction has recently been declared a failure in Dublin. For nearly two years a system of equipping cars with letter boxes in which passengers and others could deposit letters has been tried on lines in that city. It was believed that the system would prove of great convenience to the public. The Donnybrook line was first equipped, but it was soon found that the public did not avail itself, to any considerable extent, of the facilities afforded. The experiment was abandoned and boxes were then placed on the cars of the Rathmines line which passes through a much more populous district than the other line. While the system succeeded better in the latter case, it never could be said to receive popular favor. A considerable number of letters were posted on some days, but on others scarcely any mail was collected. The post office authorities have, therefore, decided that they are not warranted in continuing the arrangement, in view of the expense that attends it. It is possible, however, that when the new electric railway system is introduced in Dublin that a trolley mail service, organized on the American plan, may be found to facilitate greatly the collection and delivery of mail.

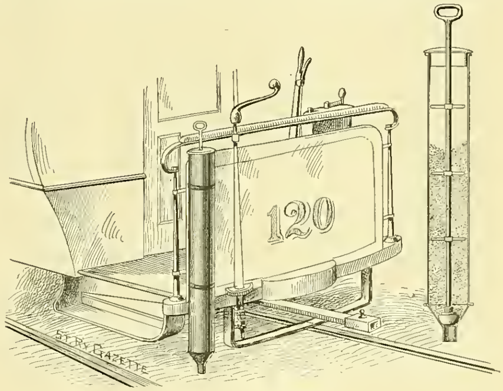


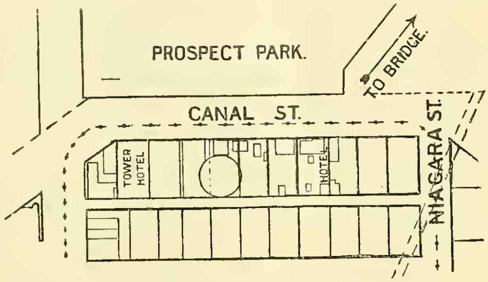
FIG. 2.—SAND BOX.

National Electric Light Association.

At a meeting of the officers and executive committee of the National Electric Light Association in New York, on May 4, the time and place of holding the next convention was discussed at length. It was proposed that the meeting should be held in New York in May, 1896, and that an electrical exhibition be organized in connection with it. A committee was appointed to decide upon the date and place of the next meeting. It seemed to be the opinion of those present that hereafter meetings should be held alternately in New York and Chicago.

Niagara Falls and Suspension Bridge Railway Company.

The officers of the Niagara Falls & Suspension Bridge Railway company state that the reports in the daily papers concerning the proposed road are in every sense incorrect. The company has no intention, it is stated, of entering Prospect Park at Niagara Falls and marring its beauty by the construction of the line. On the contrary, it proposes to afford the public means of readily reaching the park, thus promoting the purposes for which the reservation of the ground was made. The accompanying map shows the line of the proposed railway. Prospect Park is bounded on the east by Canal street, 99 feet in width for a distance of about 450 feet. While this is legally a part of the reservation, it is actually used as a public highway, as much as any other thoroughfare in Niagara Falls, and the construction of the road would injure it in no respect The company has made a contract with the Buffalo & Niagara Falls Railway Company, by which its cars will run over the former's track to the park. The new line will have, therefore, at one end Buffalo with its 350,000 inhabitants and Prospect Park at the other. The facilities for landing passengers on this road at the park will be very inadequate unless the proposed arrangement is effected, for it would be necessary that all cars should switch at the end of Falls street. If a blockade should occur, passengers would be left several hundred feet from the park entrance. The single track line which the company proposes to build through Canal street will form a loop at the terminus, running around two squares and through Canal street opposite Prospect Park, so that all cars will go in one direction and passengers may board and leave cars at the entrance of the park.



ROUTE OF RAILWAY.

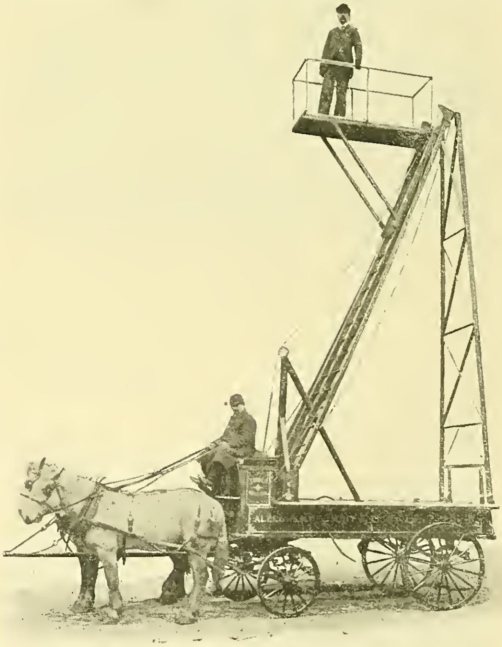
Electric Mail Cars In Boston.

The operation of mail cars over the system of the West End Street Railway Company, of Boston, Mass., was begun on May 1. Eight cars are to be operated, and it is believed that they will greatly facilitate the local distribution of mail. The arrangement of the cars, which will carry no passengers, is almost identical with that of the regulation railway postal cars. The cars, which are old horse cars remodeled, were rebuilt in the shops of the West End Company.

The two end doors were permanently closed. New doors were cut in either side. New panels were put in and new floors and underpinning. New platforms were built on each end, with dash boards that closed up the platform on one side and were completed on the opposite side with a self-locking gate. The side doors divide the mail car unevenly. The shorter end is lined with wire netting, and divided by stanchions for the storing of pouches of mail. The other end has three reversible cases for the sorting of mail. The cars are painted white and the lettering is gold.

Allegheny Tower Wagon.

The tower wagon shown in the accompanying illustration may be adjusted to any desirable height and may be handled easily by one man in addition to the driver. While designed for the use of the Allegheny County Light Company, of Pittsburgh, Pa., it is suitable for use as a street railway repair wagon. The tower consists of a large step ladder, on the sloping side of which are two parallel guides upon which slides a triangular frame supporting a platform, that can be raised or lowered to the desired height. The front of the ladder is hinged at the base to the wagon, and at the top to the back support. By folding in the latter the whole tower can be lowered so it will clear wires, or if necessary the height can be still further reduced by folding down the support at the back of the wagon, and telescoping the hand rail around the platform. The hoisting and lowering is effected by means of a winch set in the body of the wagon, the handle of which may be seen near the front wheel. The winch has two drums worked independently by means of a clutch on the handle shaft. The rope for raising the tower passes from the winch over the pulley on top of the crane post, and is fastened to the top of the ladder; the platform rope passes over a guide pulley, up the back of the ladder and over a pulley at the top, thence down to the platform. The platform is provided with hooks engaging with the rungs of the ladder to sustain it at the desired height. The wagon is 5 feet 6 inches wide, 5 feet high, and contains space for all the necessary tools of the line men. The platform is 7 feet long and 2 feet wide, and is 24 feet high in the highest position, and 18 feet in the lowest.

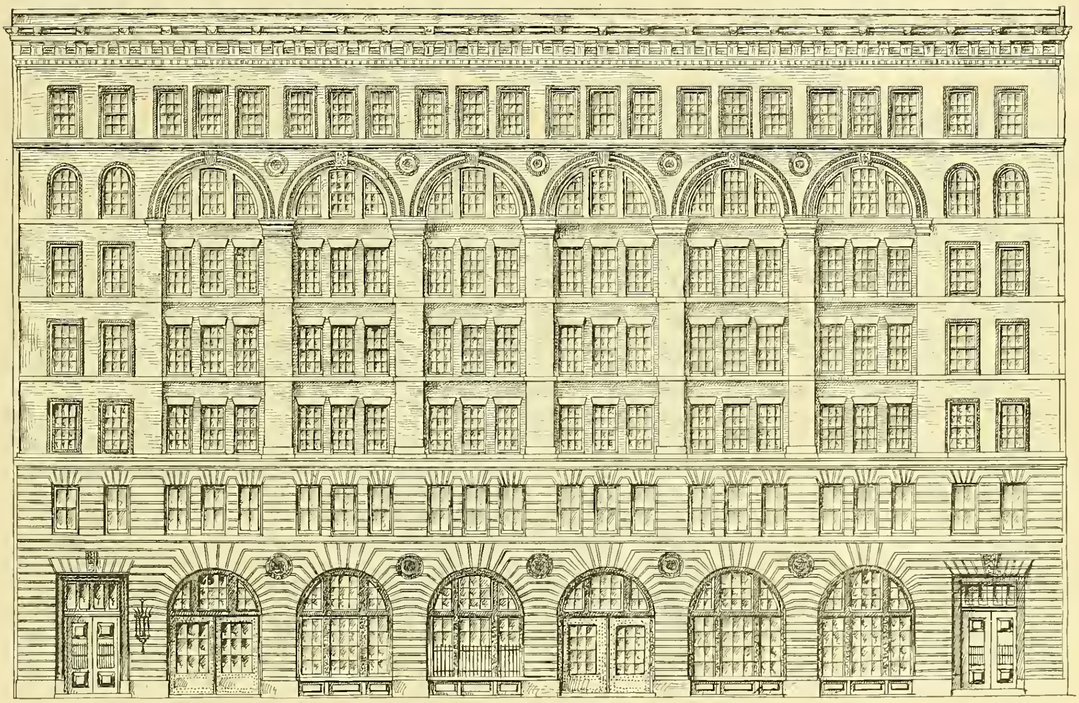


TOWER WAGON.

New Power House of the Lexington Avenue Cable Railway.

The new power house for the Lexington avenue cable line of the Metropolitan Traction Company in New York City is located between Fourth and Lexington avenues and extends through the block between 25th and 26th streets for a distance of 197½ feet. Its frontage on 25th street is 187 feet and that on 26th street is 178 feet. It is seven stories in height and is constructed of pink granite to the window sills on the first floor, above which Pompeiian brick with terra cotta and granite trimmings is used.

The windows on the first floor are 22 feet in height and 17 feet in width. The ornaments between the windows are terra cotta discs, representing the state and city coats-of-arms. There are two doors each 22 feet in height, one at each end of the building. The public entrance is near the Lexington avenue end of the structure. The doorways are trimmed with granite with ornamental bronze lamps on each side. The second story windows are arranged in groups of three and above them are large arcades embracing four stories. The arcades at the sixth story are arched with handsome terra cotta cornices and terra cotta disc ornaments are arranged between the windows.



FRONT ELEVATION OF POWER STATION.

The upper story windows are also grouped in threes and are capped by a large ornamental terra cotta cornice. The building is a massive structure and is fireproof throughout. The floors are formed with brick arches supported on steel beams. The engines and cable machinery will be located on the ground floor level with the street, while the boiler plant will be placed several feet lower. In the centre of the building is a large well at the bottom of which is a skylight for lighting and ventilating the power plant.

The stack will be provided with an outer wall extending to the full height and forming an extra flue which will be used for ventilating the power plant. The upper floors which are designed for business purposes are built without a partition, the floors being supported on steel columns.

Two large passenger elevators are provided for the use of tenants, while elevators are also provided for freight and trucks. The walls are faced with buffed faced glazed brick. The foundations for the building and the machinery are entirely independent of each other so that the vibration of the machinery will not be felt throughout the structure. The building was designed by Schickel & Company, of New York.

The Right to Smoke on Cars.

John J. Hall has brought suit against the Sixth Avenue Railway Company, of New York, to recover $25,000 damages for personal injuries caused, as he alleges, by an assault made upon him by a conductor. The plaintiff states that he boarded one of the company's cars with an unlighted cigarette in his hand. When the conductor collected his fare, he told the plaintiff that smoking was contrary to the rules of the company. Hall states that he explained that his cigarette was not lighted, but he refused to throw it away when requested to do so by the conductor. He alleges that thereupon the latter assaulted him and inflicted such injuries that he lost the sight of his right eye. The company, in its defense, states that the plaintiff was violating its rules by carrying the unlighted cigarette, and that the injuries which he sustained were the result of a personal encounter, for which it is not liable.

Rapid Transit in Philadelphia.

At a recent meeting of the Engineers' Club, of Philadelphia, the question of rapid transit in Philadelphia was discussed somewhat at length. The discussion was opened by William Wharton, Jr., who stated that the territory occupied by the city was so extensive that the lines of travel were now exceedingly numerous and divergent. The problem of rapidly, safely and cheaply transporting the thirteen or fourteen hundred thousand inhabitants throughout the 129½ square miles of area was invested with many new features and attended with complications of its own. The city, he said, had already been provided with rapid transit to some extent by the steam railways, but this service, while, as a rule, satisfactory to the patrons of the lines, did not meet the needs of the city according to the views of the advocates of rapid transit. He mentioned that the competition of electric cars with the steam railways had already taken away traffic from the latter, and the question arose whether the construction of elevated railways could be made profitable. The construction of such roads at the present time would be comparatively cheap because of the exceedingly low prices of steel and iron, and they could be successfully operated by electric motors so that the structure could be made lighter than that heretofore built. At the same time the expense attending the construction of an underground road seemed to be a fatal objection. The greatest impediment, however, to rapid transit in Philadelphia at the present time, grew out of the fact that the laws were unfavorable to the construction and operation of elevated railways.

George V. Cresson expressed the opinion that overhead roads running northeast and southwest would be needed to accommodate the growing population in those directions, as the surface transit was necessarily delayed by street travel.

James Christie stated that a system of belt roads running lighter trains at shorter intervals were required. With stations about one-quarter of a mile apart, a speed of 18 miles could easily be attained. He believed in an elevated railway as opposed to an underground road, because of the smaller cost, freer ventilation and greater convenience to the public.

John Birkinbine stated that the immediate requirements for rapid transit did not extend over the entire area of the city, but that any comprehensive plan must take in the whole, and it was necessary to take into consideration the future growth of the city. In any plan, feeders reaching settlements outside of the city boundaries would have to be provided for. He believed that rapid transit by surface roads was impracticable and that underground or elevated tracks must be provided. Either plan, he thought, was practicable except for a small area of the city, but the introduction of either on any comprehensive system would lead to an enormous outlay of money. With 150 miles of steam railway reaching to nearly every part, it would seem possible, he said, by running on circuits either with steam or electricity to cover a large portion of the area and thus form the basis of a system of rapid transit which could be materially extended, especially if a system of transfers with the surface street railway lines was arranged for.

F. Uhlenhaut, Jr., stated that while within a radius of two and one-half miles from the City Hall surface roads seem to afford sufficient accommodation, trunk lines were needed for travel to points outside.

William Wharton, Jr., said that there seemed to be an unfortunate sentiment existing in the press and elsewhere, that those impeding electric cars by unloading freight were doing something creditable. He believed that something should be done to change this sentiment and show that electric cars were run for the accommodation of the public as well as for the profit of the companies.

George A. Bullock said that while the local surface transit was second to none, he thought that the increasing population and capital would, before long, cause the construction of elevated railways for rapid transit.

John C. Trautwine, Jr., remarked that while the trolley system did not furnish a complete solution of the rapid transit problem, it was safe to assert that it was aiding those who were seeking for the solution. It was educating people up to better transportation and was forcing elevated and steam lines to introduce improved facilities.

Electric Car Heating.

In his article on the "New Science of Electric Heating," in the *Engineering Magazine* for May, W. S Hadaway, Jr., refers to the electric car heaters now in successful use on so many roads throughout the country. The famous "Electrical Heater Man" at the Franklin Institute in 1884 was, he says, the butt of the practical jokers among his co-exhibitors. The apparatus there shown was the first form of the electric car heater, with which to-day upwards of 5,000 cars are equipped. The status of the electric car heater is peculiar; it cannot be regarded as an economical device, but rather as a public requirement. An electric car is too small and crowded, says the same writer, to admit of an economical and efficient isolated system of heating. Again, very little actual heat is required under average conditions, but rather a small amount of sensible warmth, uniformly distributed to each passenger on the basis of individual effectiveness. This can be met by an electrically heated radiant at an energy consumption of less than 100 watts per square foot of surface, and, in the common 20-foot car, 20 square feet of radiating surface are sufficient for average conditions, and 35 square feet of radiating surface for extreme conditions.

Too little regard has been paid to the item of individual effectiveness in rendering cars comfortable. So much energy has been wastefully used in air warming, even under average conditions, as to render the power consumption a most serious matter. The result is to give an unjust impression as to the cost of making cars habitable by electric heaters, and in the case of elevated roads, using large cars in trains, the item is a still more important one, as the energy for heating may equal or exceed that for propulsion. Again, in the case of elevated roads there seem no good reasons why the small rooms in the stations along the line should not be heated by the same agency as the cars, and in economical work of this magnitude we appear to be forced back to the unipotential system using electricity as agent.

Opening of the Metropolitan Elevated Railway.

The Metropolitan West Side Elevated Railway of Chicago was opened to the public on May 6. Trains are to be made up for the present of three cars, but the number will probably be greater as the traffic increases. The terminus of the line will be at Franklin street, but for the present trains will be operated only as far east as Canal street.

Street Railway Engineers.—III.

A. K. BONTA.

That A. K. Bonta is an engineer more than ordinarily ingenious in designing new methods and devices of value in the operation of an electric street railway must, by this time, be a familiar fact to the readers of the Street Railway Gazette. He has been liberal, indeed, in furnishing information regarding these new features for descriptive articles which have appeared in these columns. They have been found suggestive and valuable to not a few readers engaged in the practical work of street railway operation. Mr. Bonta is superintendent and chief engineer of the North Hudson County Railway Company, of Hoboken. He has had an extended practical experience in all the mechanical and electrical branches on which the successful operation of an electric railway depends. He was born in St. Louis, in 1861. He learned the machinist's trade in the shops of the Fort Wayne Railway Company. Subsequently he accepted a position with the Thomson-Houston Electric Company. His mechanical ability was at once recognized and he was soon assigned to construction work, and he installed several large electric light plants. His first work was the installation of the People's electric light plant of York, Pa.; after its completion he took charge of the station for a year. Subsequently he returned to the Thomson-Houston Company, but soon after accepted the position of superintendent of the Hudson Electric Light Company, of Hoboken. When the North Hudson County Railway Company, of the same city, decided to introduce the trolley system Mr. Bonta was appointed chief engineer and superintendent, the position which he now holds. The entire work of equipping the several lines of the company was executed under his personal supervision. He has introduced numerous improved features in street railway practice. Notable among these is the electric safety brake, which has performed remarkably efficient work on the steep grades encountered on several New Jersey electric lines. He introduced, on the North Hudson County Railway, the patrol system, by means of which signals can be sent from points along the line when the services of the wrecking wagons are needed or trouble of any kind occurs. Its introduction has been followed by a material improvement in the character of the service.

A. K. BONTA.

Mr. Bonta recognized the fact that with the change in motive power from horses to electricity brains are needed on the front as well as on the rear platform of the car; he organized a system for the instruction of men applying for positions of motormen, that has met with the greatest success. Men who are incompetent and who fail to meet the requirements are weeded out and only those who have sufficient intelligence to master the scheme of instruction are appointed. In the management of the operating department he has introduced many niceties in details which constantly prove their value. Mr. Bonta is a young man, but he is to be credited already with the accomplishment of no little valuable work in the street railway field. He has by no means completed the list of new devices on which he has been at work during the last few years, but he has several new things under way that will prove interesting to street railway men.

Electric Road in Dublin.

By the close of the summer a new electric line running to Dalkey, a suburb of Dublin, Ireland, will be in operation. The line is to be operated by the overhead trolley system. The track is to be laid upon concrete and the paving will be done with granite blocks. The line will be fed from an armored insulated feeder cable laid between the tracks. The overhead system will be suspended from side poles located every 125 feet. Double deck cars will be operated, having a capacity for 24 passengers inside and 26 outside. Trailers will be attached to the motor car and will be drawn by horses through the centre of the city. The line is about eight miles in length.

The Boston Subway.

The bill recently introduced in the Massachusetts legislature for the repeal of the act authorizing the construction of the subway in Boston for the use of street cars in the central portion of the city has been defeated by a vote of 72 to 104. The work of construction is now in progress on the Public Garden and the Boylston street mall. The act under which the work is being carried on provides that the commission which has charge of it may grant locations for tracks in the subway to be used by street railway companies. It is authorized to order all surface tracks to be removed from Tremont street between Boylston street and Scollay Square and from Boylston street between Park Square and Tremont street. It is also empowered to order the removal of other tracks which shall be rendered unnecessary by the construction of the subway. The terms, conditions and rates of compensation for the location of tracks in the subway are to be fixed by the commission subject to the approval of the Board of Railway Commissioners.

Speed Inspectors in Brooklyn.

Fourteen inspectors have been appointed in Brooklyn by the Board of Aldermen to watch the speed of electric cars and report violations of the provisions relating to speed contained in the recent street railway ordinance. According to that measure, cars are allowed to run at a speed not to exceed six miles an hour in the business centre, and at a rate not to exceed eight miles an hour in the outlying districts. The inspectors will each be paid $3 per day and will be required to give a bond of $500. They are to serve under the chief inspector, who was recently appointed by Mayor Schieren, and their reports will be made to him. They will be sworn in as policemen, so that they can arrest motormen whose cars are traveling at an excessive rate.

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BOSTON RAPID TRANSIT SUBWAY.

All the obstacles which the Boston Subway project has thus far encountered have been overcome. No delay has been caused by the appeal to the courts, and the effort to repeal the law which authorized the improvement has utterly failed. The work is now being vigorously prosecuted, and its completion should mark the beginning of a new era in Boston transportation. There seems to be no doubt that the lease of the subway to the local street railway companies can be effected, and when this is accomplished and cars are operated on the new route, slow travel due to the concentration of traffic in the central part of the city will be a thing of the past.

ELECTRIC LOCOMOTIVES.

It is interesting to note that the effort to develop the electric locomotive on this side of the Atlantic is proceeding along a line entirely different from that which is followed in France. So satisfactory have been the results attending the use of the overhead trolley system that we pin our faith to it and are disinclined toward any change. The powerful electric locomotives to be used in the Baltimore tunnel, where they will take the place of steam locomotives and perform as heavy work as the latter, will derive their current from an overhead conductor. In France the single notable effort in this field is directed toward the production of an independent unit, which is, in fact, a traveling power station. The new electric locomotives of Heilmann constructed on this plan will soon be in operation, and as those in Baltimore will shortly be put into use, we ought to be afforded in the near future reliable data for making an interesting comparison between the two radically different types.

THE VALUE OF FRANCHISES.

There is a probability that the courts will be called upon to determine whether street railway franchises granted in Chicago are worth anything. A local company which has thus far been unable to secure a way by means of which its cars can run to the centre of the city, is vigorously claiming its right to send them over the tracks of other companies, regardless of the latter's protest against the invasion. The streets, the company argues, belong to the public, and its cars as well as other vehicles cannot be prevented by a private company from traveling on public highways. If the promises of the company are kept, an interesting state of things may be expected. It announces its intention to run cars over tracks in all parts of the city and then to test in the courts the right of the owners to forbid them to do so. If its right to pursue this course is denied, it proposes to prevent carriers from driving vehicles over its tracks. We cannot believe that the position that the company assumes will be upheld by the courts. A franchise, if it is worth anything, entitles its owner to certain privileges which amount to absolutely nothing if this novel theory is to secure judicial approval. The use of the tracks of a street railway company by an ordinary street vehicle and their use by the cars of another company are two radically different things. The second tends to interfere with the business of the owner of the tracks or at least with the company that up to this time has been assumed to be the owner. Profits that have flowed into its treasury may be diverted to that of the newcomer; in fact, practically all its rights and privileges are at once nullified. The travel of a wagon over the tracks, while it may and often does constitute an abuse, does not overthrow what have certainly been considered well settled rights. There is little danger, we believe, that the position of the company will be sustained, for the decisions of courts, so far as we are informed, are diametrically opposed to it.

BLOCKADING STREET CARS.

In discussing the topic of rapid transit recently, one of the members of the Engineers' Club, of Philadelphia, referred to the delays caused on street railway lines by teams as a nuisance which should be abated in the interest of the public. It was a fact, he remarked, that this too common practice seemed to meet with public approval. He expressed the opinion that some course ought to be followed to bring about a change in public sentiment in this respect; just what, he did not indicate. It seems to us that the feeling with which passengers regard the blockading of street cars is not that of approval, as it strikes at their own inconvenience. It is rather toleration of an abuse which has become so common that it appears to be one of the necessary evils attendant upon travel in surface cars. It is hard to explain the existing indifference on any other theory. If the public would come to the aid of the companies, the trouble could easily be overcome, for the remedy is at hand. If the police were instructed to abate the nuisance, the exasperating practice would soon be discontinued, but until the public wakes up to this fact no improvement can be hoped for.

SPEED OF ELECTRIC CARS.

That the public demands rapid transit on surface lines is proved by the decrease in traffic in Brooklyn since the speed of electric cars was materially reduced by the ordinance of the City Council. The receipts of the companies of Brooklyn should show constant gains in the natural course of events, as the city is rapidly growing, and increased facilities have been provided by the construction of extensions. During the last two weeks, since the new speed regulation went into effect, the decrease in earnings on one system has been $1,000 daily, compared with those of last year. When the speed falls below a certain point, transportation in street cars fails to promote public convenience and the patronage falls away amazingly. It is not surprising that all persons concerned are dissatisfied with the existing order of things; the public, because it is vastly inconvenienced, and the companies, because their incomes are affected. It is true, beyond a doubt, as was said at a hearing on the bill by which it is proposed to confirm, by legislative enactment, the present regulations, the compulsory reduction in speed is a violation of the implied contract between the companies and the city. When the electric system was introduced, the change was made on the understanding that better speed than was possible with horses would be permitted; otherwise the inducement to make the improvement would not have existed. The present arrangement is wholly wrong, and a change should be made in the interest of the public, even if the rights of the companies are not to be regarded.

Franchises of the Nassau Railway Company Declared Void.

Judge Smith, of Elmira, last Monday handed down a decision in which he declared that the franchises granted by the Brooklyn Board of Aldermen to the Nassau Electric Railway Company and the Kings County Electric Railway Company were null and void. The two companies are virtually a single corporation and E. H. Flynn, of Brooklyn, is president of both companies. Since the grant of the franchises the companies have been actively engaged in the construction of roads and several of the lines are about ready for opening. When the news of Judge Smith's decision reached Brooklyn, the commissioner of city works took immediate measures to stop all construction.

The action to set aside the franchises of the two companies was instituted by John Adamson, a property owner of Brooklyn, who based his suit on the allegation that the grant was fraudulent and contrary to public interest. In the original franchise granted to the company, June 19, 1893, no condition providing for compensation to the city was incorporated. This measure was vetoed by Mayor Boody. A renewal of the application for the franchises came before the aldermen, and the companies agreed to pay for any franchises which might be granted. The Union Street Railway Company was then organized as a competitor for the franchises, for which the two companies represented by Mr. Flynn had petitioned. The offer of the former was disregarded by the Council, and franchises were granted to Mr. Flynn's companies upon the following basis: The companies were to pay to the city 1 per cent. of the gross earnings until these should aggregate $20,000 per mile. Thereafter 2 per cent. should be paid until the gross earnings reached $40,000 and thereafter 3 per cent.

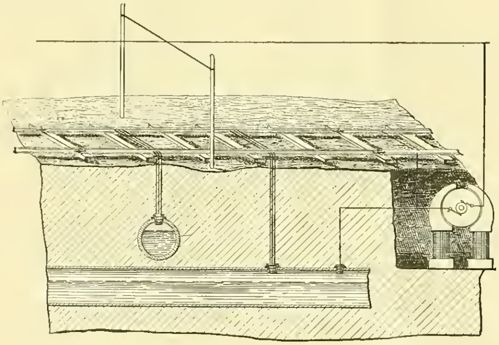
The suit to set aside the franchises was then begun. It came to trial before Judge Smith in January last. The decision which covers the entire history of the proceedings resulting in the grant of the franchises, is a voluminous document filling 17 pages of typewritten matter. In his opinion, Judge Smith states that his finding is based upon the decision of the General Term, which declares that where a common Council grants to a railway company for nothing, a franchise for which the city is offered a substantial sum of money by another company and where such action is in bad faith and a mere favor to the company receiving the grant, this action is a waste of public funds and is within the condemnation of the statute under which the suit of Mr. Adamson was brought. The court finds that the franchises in question were given for a sum less than that which could have been obtained from the competing company and were granted in bad faith as a matter of favoritism and therefore should be set aside. In the course of his decision, Judge Smith says, "In every act of the committee or of the 13 aldermen who voted for these franchises, there is an apparent determination to grant these defendant companies these valuable rights for as small a sum as they dare.

Foiled in their attempt to give them away, their studied effort is to prevent competition. False to their trust they endeavor to sell the property of their *cestuis que trustent* for as little as they can get. The evidence of their fraudulent purpose is both direct and circumstantial. It leaves in my mind not a shadow of a doubt.''

Mr. Flynn, the president of the two companies, when asked what their policy would be as a result of the decision, stated that an appeal would be taken to the next General Term and doubtless would be appealed from that court to the Court of Appeals, no matter which side was victorious. The companies, he said, had expended very nearly $2,000,000 up to the present time and had shown that they were bona fide concerns, with some of the best financial men and railway builders in the country behind them. The decision of the court, he explained, did not affect all the franchises which the companies had obtained. It related merely to those within the old city limits and none which had been obtained outside of that from the country towns before they had been annexed. He stated that the companies had no fear whatsoever in regard to their rights, as they had been examined in great detail by a number of lawyers and he was confident that a decision in the companies' favor would ultimately be secured.

Electrolysis of Street Pipes.

A patent has just been issued to Richard Watkins, of Sacramento, Cal., for an invention to prevent the electrolysis of pipes by current escaping from electric railway circuits. The patent covers the use of pipes as a part of the return circuit or, as one of the claims puts it, ''a method which consists in connecting the pipes with the return conductor proper by means of metallic conductors and also connecting the pipes with the generator forming a part of the electric circuit.'' On just what grounds the patent is issued is hard to understand. The system of connecting the rails with the water pipes to prevent electrolytic action dates back to the first days when the corrosion of pipes by escaping current was first appreciated. The second claim of the patent also covers, it would seem to us, a well-known combination. It reads as follows: ''The combination with the generator, the rails and the street pipe and the trolley line of an electrical connection between one pole of the generator and the trolley line, connections between the rails and the street pipe and connections between the street pipe and the other pole of the generator.'' The connections that are mentioned seem rather familiar. The application for the patent was filed less than a year ago.



CONNECTION OF RAILS TO PIPES.

Notes from Foreign Papers.

In its issue of April 12, the London *Electrician* publishes an illustrated paper by Mr. Dallas, on ''American Electrical Tramway Gearing.''

According to a recent official report there were, on January 1, 1895, in Italy, four electric railways, having a total length of about 7½ miles.

The *Electrotechnischer Anzeiger* of April 18 gives a few details regarding the power station for the Jungfrau mountain railway. There will be two power stations, an upper and lower one, both of which will utilize high heads of water. The total power will be 4,400 horse power. At one station there will be four dynamos of 470 horse power each, coupled direct to horizontal turbines, and a 35 horse power turbine will be used for the exciters, from which it would appear that alternating currents will be employed to run the road. In the other station there will be four dynamos directly coupled to the same type of turbine as above.

In a paper read at the April meeting of the Societe Internationale des Electriciens, some information was given in regard to the three storage battery lines established in Paris since 1892. The mileage in 1892 was 145,000, and the expense per car mile 20.6 cents; in 1893 the total mileage was 502,860, and the cost per car mile was 16.7 cents. By means of recent improvements, it is hoped to reduce the expense to 14 cents per car mile. The weight of the car and batteries used on these roads is 12 tons, the accumulators weighing 2½ tons. The coal consumption for the last year was 9.2 pounds per car mile. The batteries were formerly placed under the seats, which resulted in frequent accidents, owing to the splashing of the sulphuric acid, and the change of cells also involved considerable time. The batteries will now, however, be swung under the car between the two axles and lifted into place by means of an hydraulic apparatus in a pit below the car.

It is proposed to install the Claret-Wuillemier sectional contact system, which has been in Lyons, France, for about a year, on a four-mile Paris suburban line. The current for the cars is taken from strips of iron midway between the tracks, each strip being about nine feet long and placed about 10 feet apart from each other, the car entering on one section before leaving the other. The strips are connected with the underground circuit only while the car is over them. The feeder is located under the sidewalk and is connected to the various sections through a somewhat complicated apparatus called a distributor, which is placed at about every 300 feet along the line, and provides for the connections of 10 to 18 sections. This distributor consists of a series of contacts, one connected to each section, the contact maker being operated by the force of a weight suspended from a drum, as in a clock, and actuated by an electric magnet device, which derives its current from the section in advance of the car. The distributors also form a sort of block system, preventing two cars from getting into the same block controlled by one distributor. The shoes are made of cast iron, and fitted to the ends of a permanent magnet; the magnetic attraction between the shoe and rail thus gives a good contact.

Comments and Views of Contemporaries.

Fenders.—Even though no fender will prevent all accidents, fenders that will prevent any accidents that would happen without fenders are worth using until better ones can be found. Human life is too sacred to be denied any possible form of protection that ingenuity can contrive and money can pay for. None of the fenders in use or under experiment are costly, and it would be cheaper for the electric companies to equip their cars with a new fender every year than to pay the damages that the law will assess for accidents involving life or limb.—*Philadelphia Times.*

Slow Travel in Brooklyn.—The reduction of speed on the trolley lines to less than the rate of the old horse cars was not made in the public interest. It is a mode of punishment by the aldermen for the failure of the strike made by their friends in the winter. But, unhappily for those friends, they suffer more than do the railway companies or the public. They cannot make runs enough now to earn as much as they used to do. And as to speed, it is almost as well to be killed outright as to die of hunger and ennui on a journey to East New York.—*Brooklyn Eagle.*

Decency in Street Cars.—Perhaps no provision is more consistently violated in our city than that which prohibits drunken passengers, or those using profane or indecent language, from entering or remaining in cars or conveyances in which ladies are traveling. The officials of the street car and other transportation lines seem to be getting more and more careless in this respect, and to be permitting the conductors to grow more and more lenient with boozy inebriates or noisy and profane rowdies. * * * The street car and elevated railway officials could easily suppress this nuisance by issuing more strict rules to their conductors and guards, and making the neglect to enforce the rules cause for discharge.—*New York Mail and Express.*

Ownership of Streets.—It seems that the question as to who owns the streets of this town is still undecided. The pleasing fiction that they belong to the public and that the public has a right to say what shall be done with them seems, however, to have been disproved. So has the theory which maintains that in cases of doubt or dispute questions pertaining to street franchises should be settled by adjudication in a court of law. The methods actually employed are much more primitive and simple. Within a month the people have been twice regaled with the spectacle of transit companies seizing their privileges in accordance with the same principle upon which "sooners" seek to grab the lands of newly opened territories.—*Chicago News-Record.*

Proposed Underground Railway in New York.—What sort of chance will an underground road have in competition with these conveniences for travel above ground and in the open air? Possibly some hurried people having great distances to go might tolerate it for the sake of its higher speed, by which they would gain a few minutes, but nine-tenths of the travel, and all of the travel profitable to railways, would turn from it in disgust. It would prefer the lines passing over the face of the earth in the light of day, of which there are now so many and of which more are to be built, all of them furnishing transportation at a speed rapid enough to satisfy the requirements of the great mass of the people. The elevated roads and the cable and electric roads will have the cream. The railway through a hole in the ground, built at the cost of the city, will have to take the skimmed milk, and very little of that.—*New York Sun.*

Trolley Express Cars.—This is the one thing yet lacking to develop trolley and horse cars to their full usefulness. There is no reason why freight should not be loaded into street cars and carried at the same speed that passengers are. It is a convenience badly needed in every city in this Union. Especially the electric lines in suburban and country places would supply a great want if they sent out freight cars at regular intervals. These could be small, light and swift enough not to interfere in any way with passenger traffic. At present the arrangements for getting baggage and small freights from one part to another of any of our large cities are a grievance and a nuisance intolerable. It actually takes longer to get a trunk from one part of Chicago or New York or Philadelphia to another than it would to send it to a city 100 miles away. The street freight and baggage car is the thing.—*Brockton Enterprise.*

Cleanliness on Street Cars.—A women's club in Washington has done a very practical and sensible thing. Occasionally it will be found that evils of which women complain are partly due to their own sex, as well as to men, but in this case they are not in any way responsible, men alone being the offenders. The members of the club sent communications to the officials of the different street railways in the capital requesting that something should be done toward stopping the practice of expectorating on the cars, and they were promised that their request would be complied with.

The evil is a wide one, and instead of being confined to the boorish and ignorant, seems as if it was spreading among those who boast of their chivalry and refinement. It seems almost incredible that men who are so punctilious in merely formal matters of etiquette, such as the doffing of the hat to a lady and giving her the right of way in boarding a street car, will subject her to a filthy and disgusting annoyance, which not only offends the sight but works mischief to valuable clothing. Besides all this, medical men are unanimous in condemning the practice, declaring that there is in it grave danger of infection from pulmonary diseases.—*Philadelphia Inquirer.*

Accidents on Electric Railways.—"Many people in speaking of electric cars use the term, the 'deadly trolley,' which is libelous as well as a misnomer," remarked a manager in rehearsing the benefits the public derived in active railway construction. "Take," he said, "the number of accidents in a year to the number of people transported and note the result of a little figuring. Thousands are now carried where hundreds were carried in the times of the horse cars. A car now makes five miles where it made one mile before. One car now does the work of ten of ten years ago. Nearly 100,000,000 passengers were carried last year, not counting the deadheads and transfers, which would exceed 125,000,000. Less than 20 passengers were killed in that time. Now, can any other department of human industry show as low a percentage of fatalities as this? Absolutely none. Why, the bicycle has been the means of bringing death to half a dozen riders in this city in the same period, yet nothing is said against it. Ten or more persons were killed in 1894 in this city in elevators, then why not call them murderous affairs? When it is considered that so many machines, as electric cars can be called, are running over the streets of this city and so few people are killed, it is indeed a marvel. The 'deadly trolley' and the 'modern Juggernaut' are ill-used when applied to an electric car. I think the word 'deadly' can be appropriated by the bicycle, the elevator and the gasoline stove. They are not only vicious and 'deadly,' but also treacherous; therefore, unlike the electric car, do not give the victims any show whatever. No, I would not fear to enter the car in a contest for the word 'deadly.' Those named above, and others that I have in mind and need not be given, would be in a bunch for it."—*St. Louis Globe-Democrat.*

Lehigh Valley Road to Adopt Electricity.

It is announced that the Lehigh Valley Railroad Company will follow the example of the New York, New Haven & Hartford, the Pennsylvania, and the New York Central Railway companies and equip some of its short lines for electric traction. The first road to be reconstructed, it is said, is that at Perth Amboy, N. J., where the overhead trolley system will be installed for a distance of four miles. Both passengers and freight will be carried over the line and if the experiment is considered successful, the system will be extended to other lines.

The Astruck Fender.

The Astruck fender which is illustrated in the accompanying cuts, is so constructed that it rides in front of the dashboard wholly independently of the car, on pilot wheels that are always on the track. It is held rigidly in place by a drawbar attached to the pilot board of the truck so that it is free to act on its pivot and does not jump from the rails. It is stated that during a trial of two continuous weeks' service in Brooklyn, it picked up, while the car was traveling at eight miles an hour, three persons who were not injured or bruised by the experience. At the end of that time it was pronounced by the engineer of the railway on which it was in service, in as good condition as on the first day it was put into use—a fact which would appear to demonstrate its substantial construction.

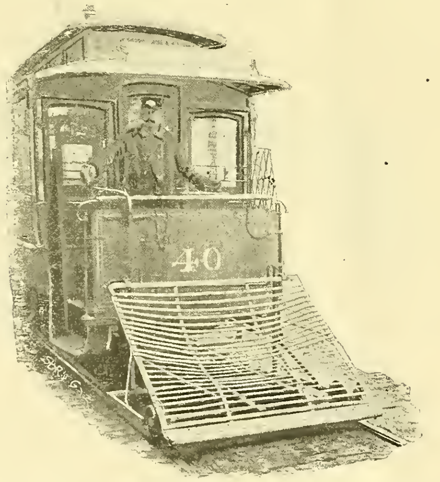


FIG. 1.

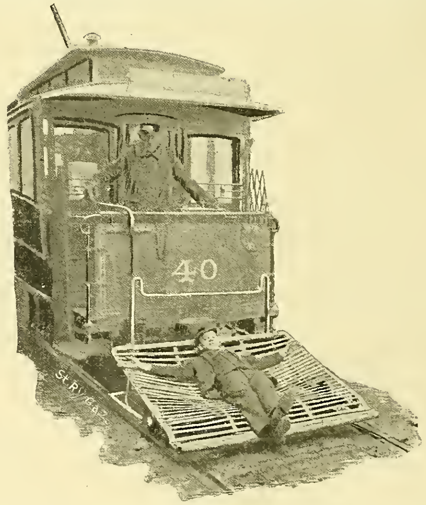


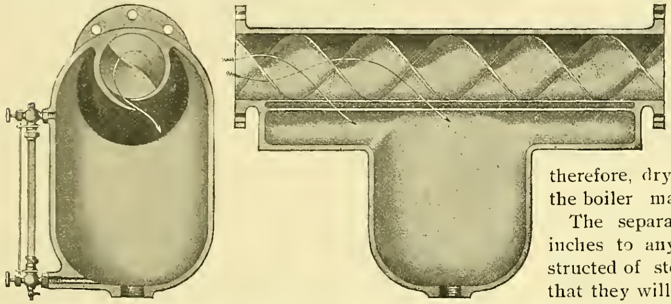
FIG. 2.

The front end of the fender is never more than two inches above the rail on curves or on straight track so that it is impossible for a person to pass under it. It extends five feet in front of the car and as it is independent, it is not affected by the oscillation. The fender frame, as shown in Fig. 1, is poised at such an angle that the upper part is just below the brake handle. It is held in this position by means of springs and it covers the lantern, the bumper, the drawbar and the dashboard itself. This is a point of no small importance, as in a considerable number of accidents persons have been severely injured by striking one of these points.

When a person comes in contact with the cushion buffer of the Astruck fender he is struck just below the ankles and falls into the bed. The shock is taken up to a great extent by the fact that the framework then slides downward on rollers at the rear and outward at the front, Fig. 2. It remains in this position until the weight is removed when it automatically assumes its normal position. It yields only when a weight falls upon it. The centre of the frame is concave so that any one who falls into it cannot roll off at the side. The inventor of the fender claims that one feature of special value lies in the fact that in rounding curves it is always on the rails in front of the car. Types which are attached rigidly to the frame of the car, he claims, protrude to one side of the track in rounding curves to such an extent that the frame may strike persons near the track who may consider themselves free from danger. At the same time the other side of the car is not protected. The fender which is shown in the illustrations was the working model first constructed by the inventor. In those to be built hereafter, the same design will be followed in all particulars, but some minor changes will be made which will tend to improve it and at the same time lessen the cost. The fender is so made that it can be transferred from one end of a car to the other, if two are not desired, and when it is not in use it may be folded and pushed under the car. To effect this it is merely necessary to take out a single bolt. This operation takes but a moment, and in attaching it to the cars in the recent trial, the work was done so quickly that the schedule time was not affected. The inventor of the fender is J. H. Astruck, 41 Maiden Lane, New York. The invention has been highly commended by those who have examined it.

The Mosher Steam Separator.

The Mosher patent steam separator for separating moisture from steam is illustrated herewith. The practical man will understand at a glance the principle underlying the operation of the device which is the utilization of centrifugal force, the most successful method of separation. Another important feature is that of at once isolating all water of separation from the current of steam, thereby rendering it impossible for any water to be picked up again and carried over to the engine.



FIGS. 1 and 2.—SEPARATOR WITH LARGE COLLECTING CHAMBER.

An examination of the cuts will show that the construction of the separator is extremely simple. The steam conduit consists of a slightly enlarged section of the main steam pipe in which is located a worm or twisted plate. The wall of the conduit is of spiral form with one lip below the other, as is shown by the cross sectional cut, thus forming a slot through which all moisture is thrown to the collecting chamber below. Thus the steam is acted on many times in its passage around the twisted plate and, the heavier particles being thrown outwardly by centrifugal force, are shaved off and deposited in the isolated chamber below, Figs. 1 and 2, from which it may be returned to the boiler.

The separator is also made with small collecting chamber, rendering it more compact and adapted for use where space is limited. The compact form is adapted to many other uses, among which are the following: For the extraction of oil from exhaust steam rendering a considerable saving in oil and preventing destruction of roofs; for exhaust pipes when steam is used for heating purposes; for preventing pipes and radiators from becoming clogged with oil and rendering them inefficient; between cylinders of compound engines to extract the water of condensation; between low pressure cylinder and condenser to avoid the clogging up of condenser by oil from cylinders. It is also serviceable in ice and refrigeration plants to extract the oil from ammonia gas, thus preventing the pipes from becoming coated on the inside by oil in cylinder lubrication, which renders them very inefficient.

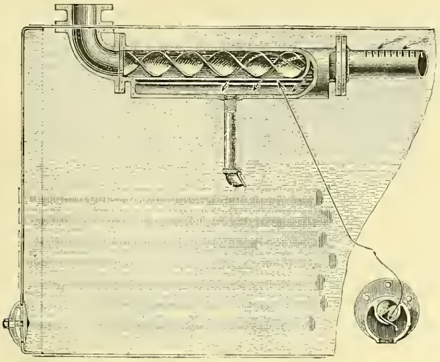


FIG. 3.

Many boilers are subject to violent priming or foaming during which a considerable amount of water is carried out of the boiler. It is claimed that the trouble may be entirely avoided by the introduction of the separator inside the boiler. The separator, which by reason of its small size may be introduced through the ordinary manhole and connected between throttle and a perforated dry pipe, will prevent wet steam leaving the boiler due to primage and, therefore, dry steam is furnished regardless of how severe the boiler may "foam" or "prime."

The separator is built in sizes from one and one-half inches to any size required. The larger sizes are constructed of steel castings or boiler plate when so desired so that they will withstand any required pressure. Separators are tested for 200 pounds working pressure per square inch.

Fig. 3 represents the separator applied inside the boiler. Fig. 4 represents a pipe full of moist steam before entering the separator, showing small particles of oil and water as they are carried along. Fig. 5 represents the condition after the steam enters the separator. The water and oil are thrown to the walls by centrifugal force, and are "shaved" from the dry steam by the action of the edge.

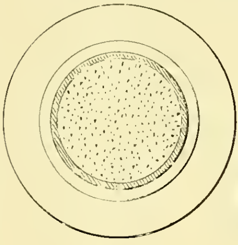


FIG. 4.

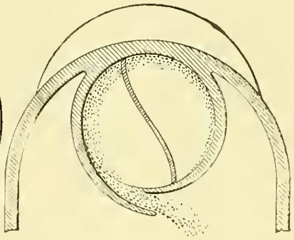


FIG. 5

These separators are built by Charles D. Mosher, 1 Broadway, New York.

Baltimore Belt Line Tunnel Opened for Traffic.

The Baltimore Belt Line tunnel was opened for traffic on April 30, and hereafter there will be no transfer of passengers across the Patapsco River. This great improvement is one of special interest, for the reason that trains are to be drawn through the tunnel by electric locomotives. There were no ceremonies in connection with the inauguration of through service by the tunnel route, although some of the officials of the Baltimore & Ohio Company were aboard the train. It was intended to have the electrical equipment of the tunnel completed in time for the first train, but the three electrical locomotives have not yet arrived from Schenectady, and coke-burning locomotives will be used to propel the trains for the present. The electric locomotives will probably be ready by June 1, and the tunnel can be kept free from smoke. The Belt Line has been in course of construction for nearly five years and has cost $8,000,000.

FINANCIAL NOTES.

PEORIA RAILWAY SOLD.—The Fort Clark Electric Railway was sold on April 30 to the bondholders for $275.000. The road passed into the hands of a receiver some months ago. The line has never paid expenses.

REPORTED DEAL IN NEW YORK.—The McMillan syndicate which is made up of a number of Wall street men, claims to have secured an option on a majority of the stock of the Second Avenue Street Railway. It is reported that it intends to cable the main road from 127th street to Peck slip.

TAMPA ROAD PURCHASED.—The Consumers' Street Railway Company of Tampa, Fla., has purchased the Palmetto Beach Railway. In accordance with the agreement by the old owners, the purchasing company will build a line from Palmetto Beach to some point in the First Ward within four months.

EARNINGS DEPENDENT UPON SPEED.—It is stated that since the new speed regulations have been in force in Brooklyn there has been a considerable decrease in traffic. The loss is estimated at over $1,000 per day, as the receipts have fallen off that much compared with those of last year. Under the normal conditions there should be considerable increase compared with last year, inasmuch as the lines have been extended and the population of the city has increased considerably.

CONSOLIDATION IN BROOKLYN.—The Kings County and Fulton Avenue Elevated Railway Companies of Brooklyn, have been consolidated. The first company ran its line to Saratoga avenue on Fulton street some years ago and had no intention of building further, but the officers of the company decided to extend their line to East New York and a new charter was obtained and another company organized to construct the extension. The two lines are one in fact and now will be controlled by a single company.

TAUNTON STREET RAILWAY.—The bill authorizing the Taunton Street Railway Company to purchase the Globe Street Railway Company and other street railways and increase its capital stock or issue bonds has been rejected by the Massachusetts legislature. The treasurer of the company is quoted as saying that this action of the legislature will not interfere with the proposed extensions of lines. The authority which was asked from the legislature, he said, was asked for to permit the company to make a purchase at any time. Had the act been passed, he said, it would have been a dozen years before the other roads were joined with the Taunton Street Railway.

BROOKLYN CITY & NEWTOWN REPORT.—The following figures appear in the report of the Brooklyn City & Newtown Railway Company for the quarter ending March 3; Gross earnings, $156,562, which is about $21,000 in excess of those for the same quarter last year; operating expenses, $101,689, or about $8,000 in excess of those of the same quarter last year; net earnings, $54,873, or nearly $13,000 greater than the corresponding period of last year. The gross earnings for nine months of the present fiscal year are $458,667, compared with $434,496 for the same period of last year. The net earnings are $176,878 for the same period, compared with $171,550 for the first quarter of 1894.

PHILADELPHIA RAILWAY LEASED.—At a meeting of the stockholders of the Hestonville, Mantua & Fairmount Passenger Railway Company, last Monday, it was voted to lease the Fairmount Park & Haddington Passenger Railway Company for a term of 999 years. According to the lease the annual rental will be $18,500. The leased line will be a branch of the Hestonville system, and it is expected that cars will be operated on it some time in June. The business of the Hestonville road has increased very satisfactorily since Jan. 1. The increase for the month of April was $16,000. The receipts on the Race and Vine street line have increased more than fourfold since the electric cars have been in operation.

REPORTED DEAL IN PORTLAND.—The Portland "Oregonian" says a deal is about to be consummated whereby the entire electric street railway system of Portland will pass under one management. J. M. Livesey, of Port Townsend, representing an English syndicate, has, it is said, an option on the property of the Portland Consolidated, the City & Surburban and the East Side Railways, comprising a mileage of 128 miles of electric lines. These three roads represent an outlay of about $3.000.000, and it is understood that the purchase price will be close to that figure. The Portland Consolidated and East Side roads are in the hands of receivers, but it is the intention of the syndicate, if the purchase is made, to adjust all claims and clear the entire system of debt.

NEW BRUNSWICK RAILWAY SOLD.—The New Brunswick City Railway was purchased on May 7, by Judge Krueger and Edward, John and Andrew Radel. It was bought for $52,500, and the new owners organized and elected officers and directors at once. They are: President, Gottfried Krueger; vice-president, John Radel; secretary and treasurer, Edward Radel; directors, John M. Metz, Andrew Radel, J. F. McDonough and John F. Krueger. The road contains seven miles of track, and the equipment is that of the ordinary one-horse street railway. It will be changed to a double-track trolley road, which will be in operation by July 1. A single track trolley road from New Brunswick to South Amboy, by way of South River and Sayresville, a line of about 14 miles, will also be built. This line is to be in operation by July 15.

ISSUE OF CERTIFICATES OF INDEBTEDNESS.—The Coney Island & Brooklyn Railway Company will issue $400.000 worth of certificates of indebtedness, dated July 1, 1895, bearing interest at 5 per cent. According to the circular that has been issued to stockholders, the certificates will be issued at such times as the executive committee shall specify. The proceeds of $250,000 of the certificates will be used to retire a similar amount of 6 per cent. certificates now outstanding. The balance will be used for construction and for making improvements on the road. In the circular already referred to it is stated that the electrical construction was begun Jan. 1, 1890, and the total amount expended for this purpose up to date is $751,997. The company's expenditures for improvements will be as follows: For 90-pound girder rails $51,500; 20 new motor cars complete, $36.000; for High street extension, $20,000; for payment of temporary loans, $29.000; for miscellaneous expenses, fenders, ties, etc., $11,000. The table showing the net earnings of the company since June 1, 1890, is very interesting. During the year ending June 1, 1891, the net earnings were $3.069 95; for the year ending June 30, 1892, $33,498 94; for the year ending June 30, 1893, $56,315.78; for the year ending June 30, 1894, $41,858.27; for the nine months ending March 1, 1895, $51,637.06.

STREET RAILWAYS OF NEW JERSEY.—Of the 38 street railway companies in New Jersey only four paid a dividend last year. These were the Camden Horse Railway Company, which paid 8 per cent on a capital stock of $250 000; the Keyport & Mateawan Street Railway Company, which paid 2 per cent. on a capital stock of $30,000; the Newark & South Orange Railway Company, which paid 2 per cent. on a capital stock of $1,500,000; the Rapid Transit Street Railway Company of Newark, which paid a dividend of $59 000 on a capital stock of $504,000, or about 11¾ per cent. This latter road paid its dividend from the proceeds of the leasing of its lines to the Consolidated Traction Company. The 38 roads have an aggregate paid-up capital of $33,656,865, and of this sum as shown by the above figures dividends were paid on only $2 284 000, leaving over thirty millions of capital non-productive. The street railways of New Jersey are bonded to the extent of $28,318,137.98 and carry additional floating debts of $2,010,168.46. This makes a grand total of $63,985,171.45 liabilities. There are, according to the reports filed with the state board of assessors, 611 miles of street car tracks in New Jersey, and the total cost of the roads, including equipments and appurtenances, was $65,519,891.08. Last year the gross receipts from all the lines were $4,267,321. All this was paid out for interest on bonds, repairs and maintenance of the roads, with the exception of $109,820 paid out in dividends on the capital stock, as shown above.

NEW INCORPORATIONS.

PORTLAND, ORE.—The City Park Company has been incorporated with a capital stock of $25,000. The promoters are S. Z. Mitchell, C. N. Huggins, and J. A. Cranston, Portland, Ore.

GRAND HAVEN, MICH.—The Grand Haven Street Railway Company has been incorporated by S. L. Monroe, Geo. W. Jenner, S. H. Boyce, Grand Haven, Mich.; the capital stock is $25,000.

FREEPORT, ILL.—The Freeport General Electric Company has been incorporated. The capital stock is $125.000. The promoters are Wm. O. Johnson, Newton P. R. Hatch, Chas. H. Hatch.

PASSAIC, N. J.—The Passaic & Newark Electric Traction Company has been incorporated with a capital stock of $250,000, by Albert S. Jones, New York, N. Y.; Chas. A. Stelling, Jas. W. Clinton, Passaic, N. J.

WILLIAMSPORT, PA.—The Edgewood & Sulphur Springs Passenger Railway Company has been incorporated; capital stock, $10,000. The following are the promoters: W. E. Ritter, South Williamsport; C. L. Crouse, Williamsport; Jno. L. Kelly, Williamsport.

FAIRMOUNT, ORE.—The Fairmount Transportation Company has been incorporated with a capital stock of $12,000 to conduct a general transportation business between the towns of Eugene and Corvallis. The promoters are Geo. M Miller, H. A Barr, L. L. Shell.

CLEVELAND, O —The Cleveland and Painesville Railway Company has been incorporated, capital stock $200,000, to construct and operate an electric street railway between Cleveland and Painesville, Ohio. The promoters are John J. Shipherd, M. H. Solloway, Nelson Moses, J. S. Casement, C. O Child.

ZANESVILLE, O.—The Zanesville & Columbus Electric Railway Company has been incorporated to build an electric railway between Zanesville and Columbus, along the National Road The capital stock is $10,000, and the promoters are W. J. Dunzweiler, Albert Adams, A. W. Evans, L. W. Doane, A. A. Patterson.

LE ROY, N. Y.—The Le Roy & Northern Railway Company has been incorporated. The capital stock is $50,000. The company will build and operate by steam and electricity a road in Genesee County, three miles long. The promoters are C F. Prentice, D. C. H. Prentice, N. B. Keeney, C. N. Keeney, Le Roy, N. Y.

PORTLAND, ME.—The Stedman Automatic Street Railway Switch Company has been incorporated with a capital stock of $600 000. The company will manufacture switches for use on street and other railways. Those interested are Wm. F. Stedman, Quincy, Mass; Herbert Moseley, Newton, Mass. Benj. J. Weeks, Quincy, Mass.

NEW YORK, N. Y.—The Esmond International Electric Traction Company has been incorporated; capital stock, $1,000,000. The company will acquire patents, patent rights relating to traction matters of every kind, etc. Those interested are Chas. C. Dodge, New York, N. Y.; Fred. C. Esmond, Brooklyn, N. Y.; Henry Seligman, Hastings, N. Y.

PHILADELPHIA, PA.—The Warwick Street Railway Company has been incorporated. The capital stock is $50.000. The company proposes to build an electric street railway in Delaware County, Pa. The promoters are Harry P. Collins, 1,838 Mt. Vernon street; J. Mortimer West, Jr., 1,524 Swain street; Henry Delaplaine, 205 South 42d street, Philadelphia, Pa.

CRAWFORDSVILLE, IND.—The Phœnix Construction Company has been incorporated with a capital stock of $100,000 to construct and operate telephone exchanges, steam and electric railways, etc., electric light and gas plants, etc. The promoters are Noah J. Clodfelder, Crawfordsville, Ind.; Jacob Frankel, Isidore Crohs and John W. Paris, of Indianapolis, Ind.

CHICAGO., ILL.—The Chicago Subway Arcade & Traction Company has been incorporated with a capital stock of $15.000.000. The company proposes to construct, own and maintain and operate a system of subways and dummy railways, maintain and furnish necessary system of power, light, heat, ventilation, pavements, conduits and other constructions. Those interested in the company are Chas F. Griffin, Marvin E. Barnhart and Jno. K. Nelson.

WAKEFIELD, N. Y.—The Edenwald Street Railway Company has been incorporated to construct and operate an electric street surface railway in Wakefield, Westchester County. Capital, $50,000. Directors: Jefferson M. Levy and G. Waite Tubbs, New York City; John M. Digney, White Plains; Matthew C. Lure, Peekskill; Herbert D. Lent and Theodore H. Sillman, Yonkers; George J. Penfield, Wakefield; John Duffy, White Plains, and David H. Hunt, Williamsbridge.

WATKINS, N. Y.—The Watkins and Havana Electric Railway Company has been incorporated. The company is composed of prominent business men of Elmira, Montour Falls, and Watkins, whose object it is to construct an electric line between the Northern Central depot, in Watkins, and the entrance to

Havana glen, a distance of four miles or more. At some future time the road will probably be extended northward to Salt Point and southward to Horseheads, although these extensions are not mentioned in the articles of incorporation. The capital stock of the company is $50 000.

NEWS OF THE WEEK.

SYRACUSE, N.Y.—The City Council has passed an ordinance making the use of fenders on electric cars compulsory.

PORTLAND, ORE.—The Union Street and Suburban line is to be extended into the timber belt east of the Grand Ronde.

ROCKLAND, ME.—The Rockland, Thomaston & Camden Street Railway Company has decided to build the Thomaston extension.

BROOKLYN, N. Y.—Samuel Wilson, a motorman, was fined $50 by Justice Walsh for operating his car at a speed greater than that allowed by the city ordinance.

MILWAUKEE, WIS.—It is announced that the work of substituting electricity for steam dummies on the Milwaukee & Wauwatosa Motor Railway is to be begun at once.

PONTIAC, MICH.—M. B. Mills, of Detroit, who is interested in the proposed electric line between Pontiac and Sylvan Lake, states that the improvement will be made this summer.

JERSEY CITY, N. J.—Chancellor McGill has issued a temporary injunction restraining the Consolidated Traction Company from crossing the tracks of the Montclair & Greenwood Lake Railway at Arlington station.

JAMAICA, L. I.—Five hundred men are at work on the new electric railway. According to the contract cars must be running from the Kings County Elevated Railway station to Far Rockaway and the Beach by July 1.

CHICAGO, ILL.—A party of New York capitalists, who are stockholders in the Metropolitan West Side Elevated Railway, which is operated by electricity, recently visited Chicago and made a trip of inspection over the line.

PHILADELPHIA, PA.—The jury in the case of Patrick Nugent against the Philadelphia Traction Company last week gave a judgment in favor of the plaintiff for $11,000. Nugent was run over by a cable car a year and a half ago.

CHICAGO, ILL.—John F Waters, a lawyer, has been arrested on charges of subornation of perjury. It is alleged that in cases of personal damages against the West Chicago Street Railway Company he inspired witnesses to give false testimony.

BOSTON, MASS.—The street railway committee of the House recently brought in a report disapproving the bill requiring the West End Company to issue free transfers. A substitute for the adverse report requiring the company to issue transfers was adopted.

PHILADELPHIA, PA.—The Select Council has passed an ordinance authorizing the chief of the electrical bureau to issue permits for the attachment of electric light wires to the poles of the electric street railway companies. A great deal of opposition was made to the measure.

CHICAGO, ILL—The Wentworth avenue electric line has been opened. The line runs west on 39th street to State street and south on Wentworth avenue to 79th street. The new power house of the Chicago City Railway Company, at 52d and State streets, will be finished in about two weeks.

POTTSTOWN, PA.—The Ringing Rocks Electric Railway resumed operations last week after a suspension of five months. The company is to make many improvements at Ringing Rocks Park, three miles north of the city. A switchback road 400 feet long and other attractions will be operated.

NEWARK, N. J.—The roads and assessments committee of the Essex County Board of Freeholders has recommended the grant of a franchise to the Passaic & Newark Railway Company. This privilege will enable the company to complete the electric road connecting Newark and Paterson.

GREENSBURG, PA.—The Pennsylvania Railway Company has brought suit against the Greensburg, Jeannette & Pittsburgh Electric Railway Company to prevent it from building two bridges over the plaintiff's line. It is claimed that the proposed structures are not strong enough for the purpose.

ALBION, N Y.—Part of the track of the Beecher single track road, between Waterport and the lake, has already been finished and the work is being pushed rapidly by a large gang of men. Work has been commenced on an experimental car to test the possibilities of the system for high speed.

BROOKLYN, N. Y.—The Atlantic Avenue Railway Company has signed an agreement with the Brooklyn, Bath & West End Railway Company by which a direct connection is made with the Fifth avenue line of the former company at 37th street. The Union Depot at that point is to be abandoned by the West End road and a connection is to be made at 37th street.

PITTSBURGH, PA.—One passenger was killed and two more seriously injured by jumping from an electric car on the Troy Hill road last Sunday. A trolley sprinkling car became unmanageable on the grade, and passengers on the car following it, seeing that a collision was inevitable made a dash for the plat form and three of them jumped, with the result mentioned. The collision which followed wrecked both the cars, but those who remained in their seats were not seriously injured.

NEW BRUNSWICK, N. J.—It is the intention of the syndicate of Newarkers which has acquired the line and franchise of the local street railway to equip the system with an electric trolley line as quickly as possible. The new trolley line will be extended to the neighboring towns of Bound Brook, Milltown and South River as soon as it is in successful operation in New Brunswick. It will ultimately be extended to South Amboy and form a part of the trolley system along the Jersey coast.

BALTIMORE, MD.—The general route for the proposed electric railway has been selected by the officers and engineering corps of the Baltimore, Severn Park & Annapolis Railway Company The route selected is from Brooklyn, Anne Arundel County, across the country to Glenburnie, thence through Severn Park to Indian Landing and along the south side of the Severn to Annapolis. It is announced that the company expects to complete the line to Severn River by next December.

NEW ORLEANS, LA.—The Louisiana Electric Light Company has begun a suit against the New Orleans Traction Company for $27,775.71. The plaintiff alleges that it contracted to furnish the defendant with the power needed by it, and that the latter agreed to construct its lines in such a manner that loss in transmission should be kept to a minimum. The claim is that the company has wasted a vast deal of power as the result of poor construction, and by the employment of incompetent employees, and the amount claimed is for the waste under these conditions.

PHILADELPHIA, PA.—The Board of Surveys has approved the plans for the double track extension of the Electric Traction Company's Franklinville line to Fox Chase. A large part of the line will be constructed temporarily with T-rails. The Board also approved the plans of the Holmesburg, Tacony & Frankford Street Railway Company, which will build a single track overhead trolley line from Bridge street, Frankford, to Torresdale, about seven miles This company, it is understood, is controlled by Senator Charles A. Porter, David Martin and William J. Latta, and its president is A. J. Mullen. The company has an agreement with the Electric Traction Company, by which passengers will be carried from Frankford to the city.

PERSONAL.

MR. G. H. VAN DER SCHUYT, of Rotterdam, Holland, was in New York this week. One of the objects of his visits to America is to investigate electric traction systems.

TRADE NOTES.

HAROLD P. BROWN, electrical engineer and designer, formerly of the Edison Building, 44 Broad street, has moved to the Morris Building 68 Broad street, New York.

THE CENTRAL ELECTRIC COMPANY, of Chicago, finds that its street railway department is rapidly extending, as the goods are giving great satisfaction in practical use.

THE M'GUIRE MANUFACTURING COMPANY, of Chicago, Ill., has secured the contract for 56 trucks from the Consolidated Street Railway Company, of Cincinnati, O.

THE WALLACE ELECTRIC COMPANY, of Chicago, is now settled in its new store. With the improved facilities the company can make prompt shipments, no matter how large the orders may be.

BERLIN IRON BRIDGE COMPANY'S CONTRACTS.—The new crematory building at the Brooklyn Navy Yard is now being put up by the Berlin Iron Bridge Company, of East Berlin, Conn. The new machine shop for the Goulds Manufacturing Company, at Seneca Falls, N. Y., will be designed and built by the same company. The building, as designed, will be constructed with a steel frame and a 15-ton traveling crane.

Record of Street Railway Patents.

UNITED STATES PATENTS ISSUED APRIL 30, 1895.

39,249. LIFE-SAVING ATTACHMENT FOR STREET RAILWAY CARS; James P. Fleming., Albany, N. Y., assignor of one-half to Michael F. Smith, same place. Filed Jan. 4 1894. The attachment comprises a standing frame consisting of a vertical portion and a horizontal portion which are hinged together. An inclined netting is atttached to the frame, in which a sliding frame is so fitted that it slides in the horizontal portion of the former. A spring bolt is fitted to engage with and lock the sliding frame in its retracted position. The spring bolt is connected with the inclined netting and a roller which is arranged at the outer end of the sliding frame is flexibly connected with it in such a way that the outward movement of the sliding frame will cause a rotatory motion of the roller.

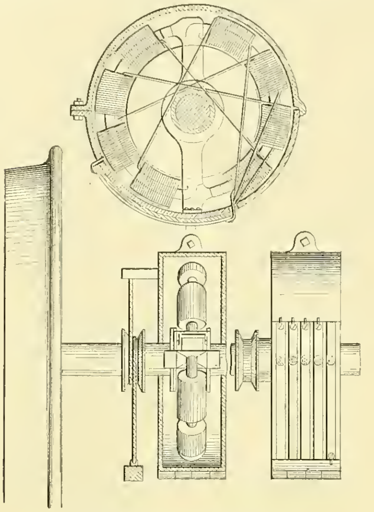
38,275. ELECTRIC BRAKE; Carl E. Pearson, St. Louis, Mo , assignor of two-thirds to Ernst G. Bruckman and Samuel E. Bruckman, same place. Filed April 2, 1894. A spider frame is loosely mounted on a shaft and on it magnet cores are pivoted. Polar extensions are carried by the latter. Means are provided for energizing the coils on the cores so that the polar extensions are magnetized and will be attracted to a revolving disc. (See Illustration.)

538,283. STREET CAR REGISTER; Gustavus Rein, St. Louis, Mo., assignor to the St. Louis Register Company, same place. Filed March 17, 1894. This is the combination of a permanent register, a trip register comprising a dial and an index or pointer, one of which parts is movable and normally in gear with the permanent register. Means are provided for moving the latter's part of the trip register out of gear with the permanent register and resetting it relative to the stationary part of the trip register.

538 295. TROLLEY; Judson D Swacick, Canton, O. Filed Oct. 29, 1894. Spindles are secured to the supporting frame, the wheels being composed of two parts, one having an oil chamber and a screw thread edge, and the other having a thread edge to take the threaded edge of the chambered part. A set-screw serves the double purpose of preventing the two parts from unscrewing and affords means for allowing a lubricant to be introduced into the chamber.

538 298. CAR VENTILATOR; James Timms, Columbus, O. Filed Jan 17, 1895. The ventilator comprises a case restricted at the centre and open and flaring at the ends. A valve is centrally pivoted at each end, the free ends terminating in proximity to each other. One of the valves is adapted to form a dividing or partition wall while the other serves as a deflector.

538,325. **MEANS FOR VENTILATING ELECTRIC MOTORS ON CARS**; James J. Devine, Clifton Heights, Pa. Filed March 14, 1895. A conduit is arranged under the car extending the entire length. It is provided at its end with caps which may be opened or closed as desired. There are flexible connections between the pipe and the lids of the motor box and an opening is provided from the motor box into the main pipe. (See Illustration).

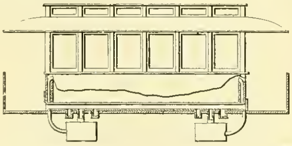


No. 538,275.—Electric Brake.

538,357. **UNDERGROUND ELECTRIC RAILWAY**; James F. Smith, New York, N. Y. Filed Aug. 15, 1894. It consists of U-shaped outer-sections with H-shaped sections arranged in it between and separated from the side plates. The slot rails are applied to the upper edges of the H-shaped sections and angle irons are applied to the upper edges of the U-shaped section abutting against the slot rails.

538,364. **SAFETY ATTACHMENT FOR STREET CARS**; Oscar Beck, Newark, N. J. Filed March 16, 1894. Longitudinally movable guard rails are mounted on suitable bearings or supports secured to the truck frame at each side of the car and in close proximity to the track rails. A safety guard or receptacle is arranged at each end of and in line with the guard rails, being firmly screwed to the latter. Means for projecting the safety guards in either direction are provided.

538,373. **CONDUIT SYSTEM FOR ELECTRIC RAILWAYS**; Frank H. Homan. Brooklyn. N. Y. Filed April 24, 1894. This is a conduit railway with a slot. An insulated prime conductor is supported within the conduit, being provided with branch conductors which have at intervals exposed portions. A conductor composed of sections has insulated joints connecting their ends. There is a counter-balance lever for suspending the sectional conductor in yielding adjustments at both sides of the insulated joints and at a short distance from the exposed portions of the branch conductors. A return conductor extends along within the conduit. The prime conductor, the sectional conductor and the return conductor are below and to one side of the slot. A transmission trolley runs on the sectional conductor for supplying the current from the prime conductor to a motor, and a trailing trolley runs on the return conductor for returning the current from the motor to the return conductor. (See Illustration).



No. 538,325.—Method of Ventilating Motors.

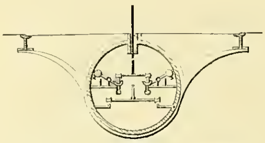
538,390. **TROLLEY BREAKER**; Walter R. Scott, Buffalo, N. Y. Filed Dec. 19, 1894. The hanger or coupling has an end piece provided with a longitudinal eye frame formed integrally therewith and adapted to receive a wire. In the rear of the eye are a pair of upright ears separated by a space which receives the end portion of the wire. Front and rear pins connect the ears, the wire being bent around the rear pin and the front pin bearing upon the doubled end of the wire.

538,391. **TROLLEY WIRE HANGER**; Walter R. Scott, Buffalo, N. Y. Filed March 5, 1895. The body of the hanger is provided with a seat for the trolley wire, a pair of cams or eccentrics with which a lock engages being pivoted to it above the seat.

538,408. **ELECTRIC TRANSMISSION WHEEL OR TROLLEY**; Charles C. Burton, Pittsburgh, Pa., assignor of four-fifths to Curtis G. Hussey and James C. Des Granges, same place; Lewis E. Holden, Beloit, Wis., and Geoge M. Ludlow, Chicago, Ill. Filed Aug. 11, 1894. The trolley wheel has a rigid rim with a seat in the outer face thereof. There is a rubber tube around the rim fitting in the seat, and a series of contact blocks mounted in the rim extends over the rubber tube.

538,409. **TROLLEY WHEEL**; Charles C. Burton, Pittsburg, Pa., assignor of four-fifths to Curtis G. Hussey and John C. Des Granges, same place, Lewis E. Holden, Beloit, Wis., and George M. Ludlow, Chicago, Ill. Filed Aug. 24, 1894. The wheel has rigid rims with contact blocks around the periphery. There are lugs on the blocks and retaining rings, having recesses formed in them and secured to the rim. The lugs which enter the recesses are adapted to move backward and forward therein, springs being introduced between the rim and the blocks.

538,456. **CAR FENDER**; Charles E. Montell, White Plains, N. Y., assignor to Jesse F. Griffen and George W. Coventry, same place. Filed June 9, 1894. A cushioned receiving frame is pivotally connected with a stationary frame which is attached to the platform. The yielding bed of the former is connected at the top with the upper portion of the stationary frame and at the bottom with the front of the receiving frame. Wheels support the receiving frame at the desired distance from the track. A shaft is attached to the receiving frame having a sprocket wheel secured upon it. A second sprocket wheel is adapted to be supported adjacent to the fixed frame. The latter wheel has a recess in it and a chain belt connects the two wheels. A spring controlled bolt is adapted to enter the recess in the inner sprocket wheel so that when the bed is depressed the receiving frame will be carried upward to a predetermined angle to the stationary frame and held there by the bolt.

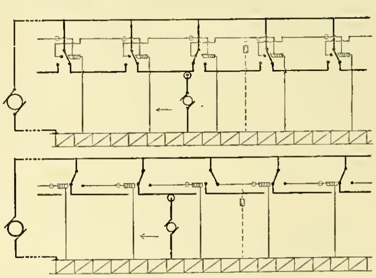


No. 538,373.—Conduit System.

538,458. **RAIL CONNECTOR**; Louis E. Myers, Chicago, Ill. Filed Dec. 19, 1894. This is a bond comprising a wire which is longitudinally split at its ends. Split sleeves or thimbles are adapted to receive the ends of the wire and to be driven into holes in the rails.

538,569. **TROLLEY POLE RESTRAINER**; Frank Wheeler Meriden, Conn. Filed Feb. 8, 1895. The mechanism for automatically exercising the retracting tension on the trolley pole rope comprises a spring, which has a power greater than that of the spring of the trolley pole. There is a slotted tube in which there is a block or head movable in it and connection is made between the head and the spring. A handle extends from the head through the slot and a catch or detent holds the head with its spring under tension. The catch is adapted to be released by a pull on the trolley rope. Means for detachably connecting the rope with the head or detent are provided.

538,590. **BLOCK SYSTEM AND APPARATUS ON ELECTRIC RAILWAYS**; Eugene Langen, Cologne, Germany. Filed July 16, 1894. Patented in France, Belgium, Switzerland, Turkey and Italy. The contact conductor is divided into block sections, while an auxiliary contact conductor is divided into corresponding block sections. A switch on each contact conductor section is adapted to be removed by a passing vehicle so as to cut the section out of circuit. An electro-manget on each auxiliary conductor section is designed to move the switch of the preceding section and put it into the circuit again. (See Illustration.)



No. 538,590.—Block System.

538,591. **CAR FENDER AND TRIP**; Charles Mahon, Washington, D. C. Filed March 11, 1895. The fender is adapted to come in contact with the ground and in doing so to send a rod forward. A spring is fixed at one end to a stationary point having a knuckle normally adapted to abut against the end of the fender rod. A pivoted trip is adapted normally to support the free end of the spring and thus keep the fender up.

538,631. **CAR-FENDER OR GUARD**; Edgar Thomas, Pittsburgh, Pa., assignor of one-half to Marion P. Hatch, Buffalo, N. Y. Filed Dec. 5, 1894. The fender is provided with a movable member normally elevated from the track. The actuated device for the movable portion consists of a rock shaft, a crosspiece or bar suspended therefrom and an arm extending upward toward the car body, having a slot or opening. A lever is pivotally supported at the rear of the movable member to which one arm is connected. A rod is connected to the outer arm and extends loosely through a slot. Means are carried by the rod to afford a bearing against which the arms may act.

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Brooklyn Bridge Terminal Station.

No one who crosses the Brooklyn Bridge during the busy hours can fail to appreciate the urgent need for the improvement in the terminal facilities that is now in progress. The overcrowding is at present so great that it has reached the danger point. That accidents are so few seems attributable rather to the experience of those who patronize the bridge railway than to any provision made to guard against them. With the existing facilities at the terminals it seems practically impossible to throw around the passenger traffic such safeguards as are ordinarily arranged. The space on the station platforms is too contracted to permit the construction of railings to guard the tracks, so that dependence is placed altogether on the ability of the crowd to keep away from the point of danger.

The present state of things, dangerous in the extreme, will pass away with the completion of the new terminals. The Brooklyn terminal station is now well under way, and from the accompanying illustrations it may be seen how well it has been designed to meet the peculiar traffic conditions. The transportation lines of Brooklyn, to a very large extent, converge at the bridge terminal, and the passengers are almost wholly those going to or coming from New York. The problem to be solved in the arrangement of the station, was the accommodation of this traffic bound for the bridge cable cars in the morning and scattering to the various transportation lines of Brooklyn at night. At present on the Brooklyn side there is vast overcrowding on the platforms of the bridge railway in the morning, and at night there is confusion and crowding due to the passengers struggling in a cramped area toward different exits. The new building is arranged with a view to providing convenient approaches to and from the bridge trains. One elevated structure is run into the terminal station, and ample and convenient approaches will be provided for reaching other transportation lines and the street. As an avenue is open in every direction, the movement of passengers will, in every case, be straight ahead and no confusion can arise from persons endeavoring to cross counter to the general progress of the crowd.

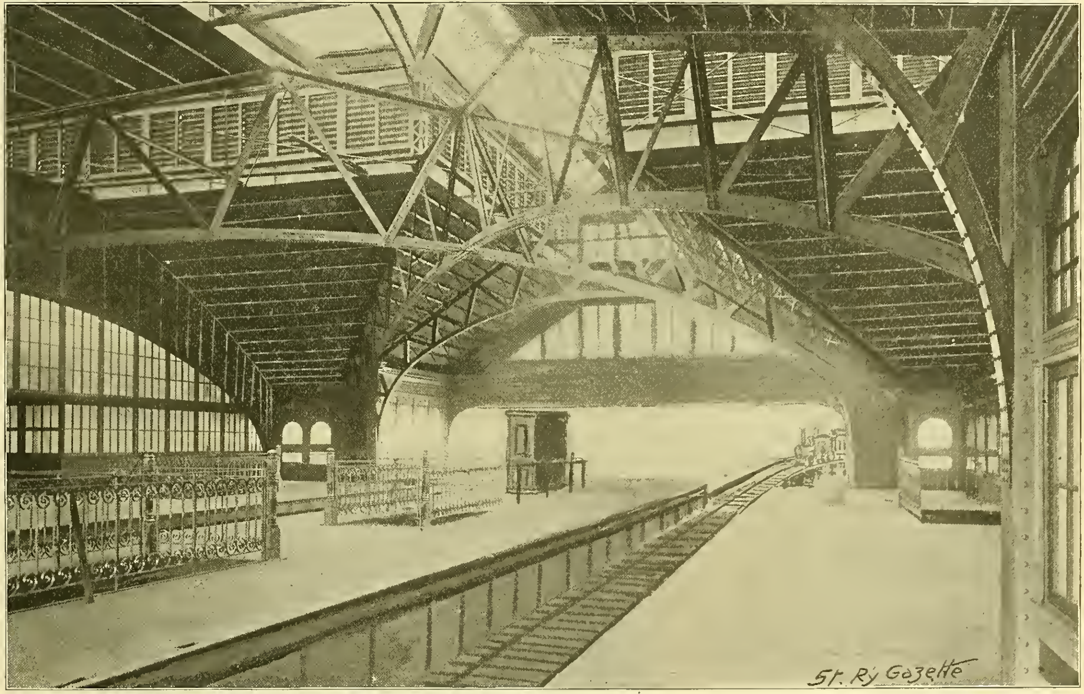


FIG 1.—SECTION OF TERMINAL BUILDING, SHOWING ELEVATED RAILWAY PLATFORMS AND TRACKS.

The Brooklyn terminal building is mainly constructed of iron and steel and is three stories in height, with a slate monitor roof. The walls of the first story are of brick and those of the upper stories are of iron and glass. The total length of the building, extending from a point 35 feet north of Sands street to High street is 350 feet. Its width from Washington street to the Bridge Plaza is 88 feet 10 inches. It is constructed with an L at each end, 25 feet in length and of the same height as the main structure.

The waiting and toilet-rooms for passengers are located on the first floor and will be extensive and handsomely finished. The walls are of glazed brick to the window sills, and above that point of pressed brick. Large stairways lead from the waiting-rooms to the platforms of the bridge railway on the second story. The general arrangement of the tracks of the bridge railway and passenger platforms is shown in Figs. 2 and 7. Two platforms are provided, each 20 feet in width and extending nearly the entire length of the terminal station. The tracks of the bridge railway, four in all, are located on each side of the platform. Two will be used by the incoming and two by the outgoing trains. The trains entering the station on the first track, after the passengers from New York have alighted, will be transferred to the third track where they will be boarded by passengers going to New York. The trains entering on the second track will leave on the fourth track. By this arrangement of double platforms, trains can be dispatched on about 45 seconds headway, so that about double the number of trains now in service can be run.

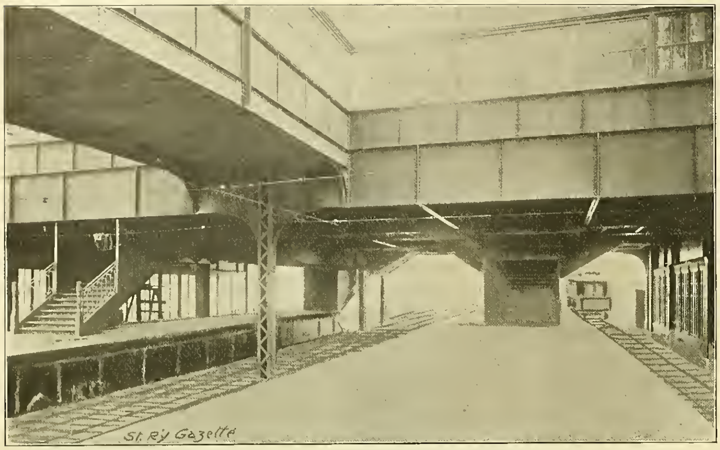


FIG. 2.—SECOND STORY OF TERMINAL BUILDING, SHOWING BRIDGE RAILWAY TRACKS AND PLATFORMS.

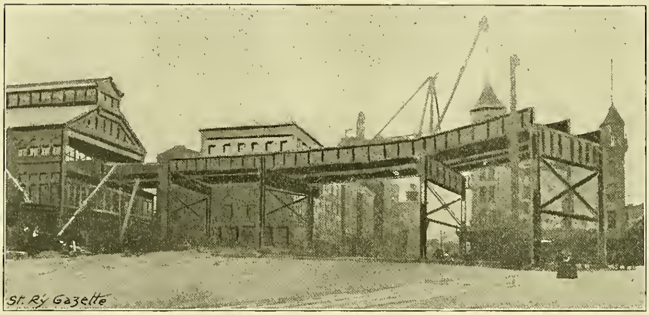


FIG. 3.—BUILDING ELEVATED LOOP.

Numerous large entrances are provided on the first floor and with the large stairways leading to the bridge, the arrangements for handling the large crowds of people coming from the street and surface cars are ample.

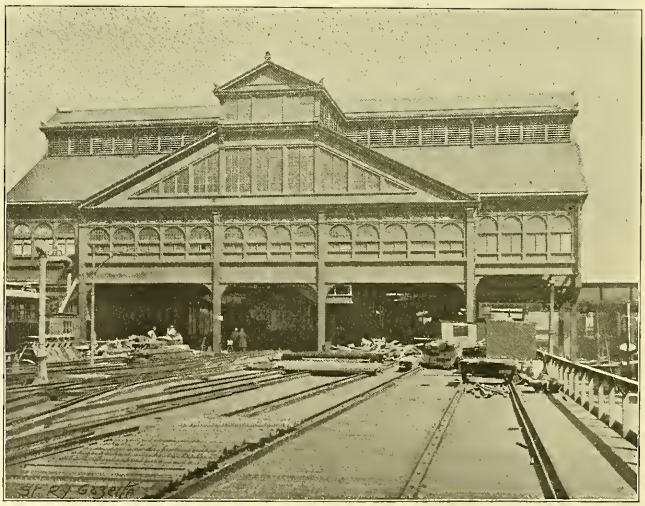


FIG. 4.—SOUTH FACE OF TERMINAL BUILDING.

The trains of the Brooklyn Elevated Railway Company which operates the Ridgewood, East New York and Fifth Avenue lines will enter the third story of the terminal building at the Sands street end, Fig. 1, and leave the structure on an elevated loop built on the Plaza at the High street end. The work on the elevated loop, which is illustrated in Fig. 3, is now in progress. A new elevated structure has also been constructed for the Brooklyn Elevated Railway extending on High street from Washington street to Adams street where the trains run on the old tracks. At each end of the terminal building, where the elevated railway trains enter, platforms have been constructed for the incoming and outgoing passengers. They are three in number; one on each side of the tracks, 10 feet in width, extending the full width of the building, and one a central or island platform, 20 feet in width between the tracks, extending the width of the building. Large double stairways lead from the platforms to the cars of the bridge railway on the floor below.

The trains of the Fifth Avenue line will enter the terminal building on the north track at the Sands street end, and will stop there at the platforms to let off and take on passengers. The trains will then pass around the loop and through the High street end of the building without stopping. The trains of the Ridgewood and East New York line will pass through the Sands street end of the building around the loop, stopping at the High street end where passengers will leave and board the trains.

Ticket booths and boxes for the reception of tickets will be located near the head of the stairways leading to the bridge cars. The central platform will be used by persons boarding elevated trains, while passengers will leave these trains by the side platforms. Two ticket booths are located on each of these platforms for the sale of elevated railway tickets, shown in Fig. 1.

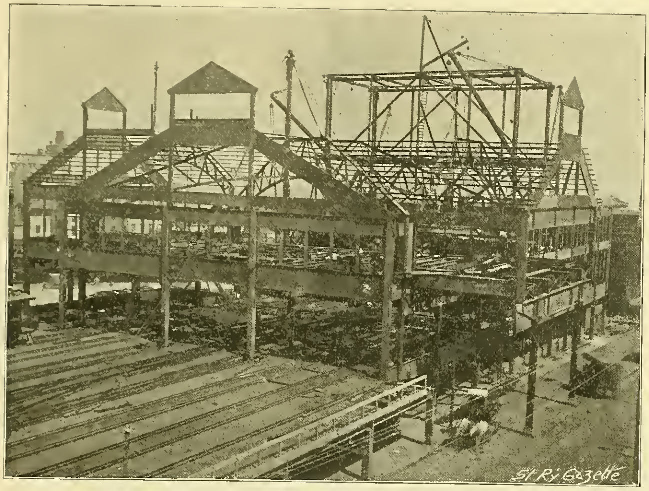


FIG. 5.—TERMINAL BUILDING IN COURSE OF CONSTRUCTION.

The present bridge terminus of the Kings County Elevated Railway Company's Fulton Street line will be removed, and a new station is to be constructed over the Plaza, between Sands and High streets. An elevated passageway for passengers will extend from the station across the Plaza to the centre of the new terminal building, and wide stairways will lead both to the outgoing and incoming trains.

The construction of the building throughout is of the most substantial character. The contractors for the structure were the Phœnix Bridge Company. The stairways and ornamental iron work was done by the Hecla Architectural Works, of Greenpoint. The floors throughout the building are constructed with brick arches and steel beams, over which is placed a layer of concrete and asphalt. The new structure will probably be ready for the use of the public about the 1st of July.

One of the last acts of the New York Legislature was the passage of the bill appropriating $160,000 for the completion of the bridge terminals. It was feared the bill would fail, but it went through at the last moment in its original form. The Senate refused to concur in the Assembly amendment legislating the bridge trustees out of office.

Brooklyn Heights Company Pleads Not Guilty.

The Brooklyn Heights Street Railway Company has pleaded not guilty to the indictment charging it with manslaughter in the second degree. The trial is set down for June 3. The charge against the company is that through the careless manner in which its cars were operated, it caused the death of Mrs. Mary A. Medinger, in Brooklyn, on March 26. She had alighted from one car and stepped behind it, and in attempting to cross the street was struck by a car coming in the opposite direction.

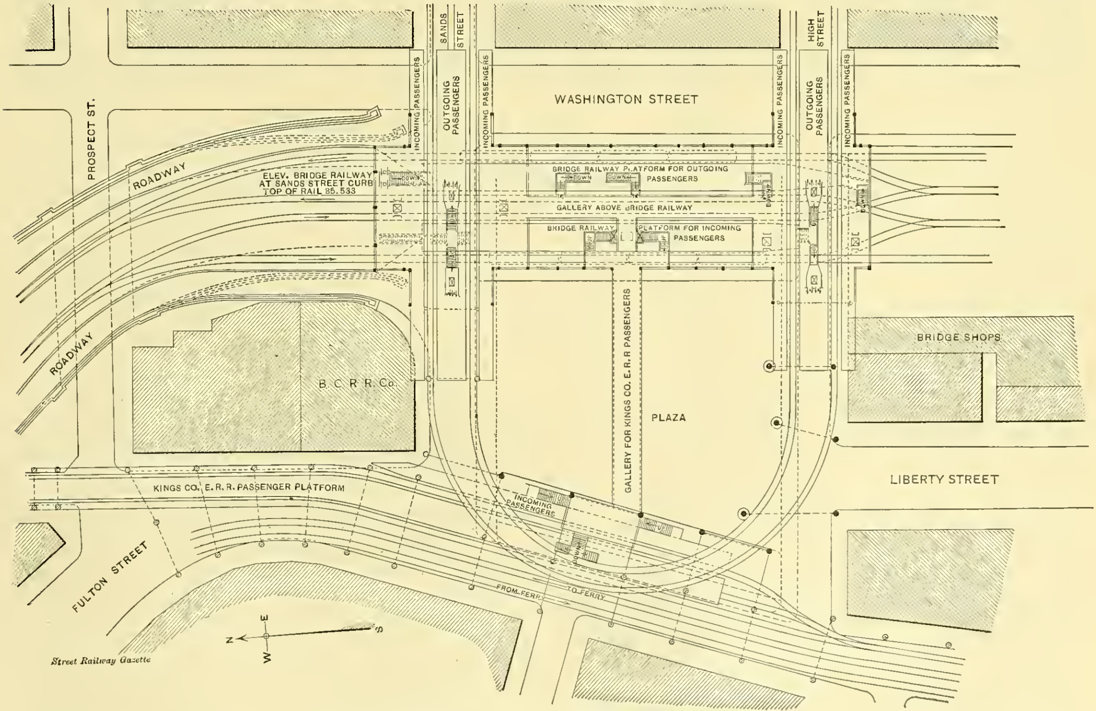


FIG. 6.—GENERAL PLAN OF TERMINAL BUILDING.

Franchises of the Nassau Electric Railway Company.

Judge Smith gave a hearing in Elmira last Saturday to determine the terms of the decree which should be entered as a consequence of his decision in the case of Adamson against the Nassau Electric and Kings County Electric Railway Companies of Brooklyn. It will be remembered that Judge Smith set aside the franchises granted the companies by the Brooklyn Board of Aldermen, on the ground that they were given fraudulently and as a matter of favoritism to the Nassau Company. The request of the defendant counsel that the decree should provide that if the defendant companies should pay into the city treasury 3 per cent. upon its gross earnings the franchise should not be declared void, was denied by the court. Their request that inasmuch as the court had declared that the grant was a waste of public funds and that the court should ascertain the amount of the waste was also denied. The court granted a stay of 30 days, in order that an appeal might be taken. The order provides that tracks and all work done by the company shall not be disturbed until the appeal of the company.

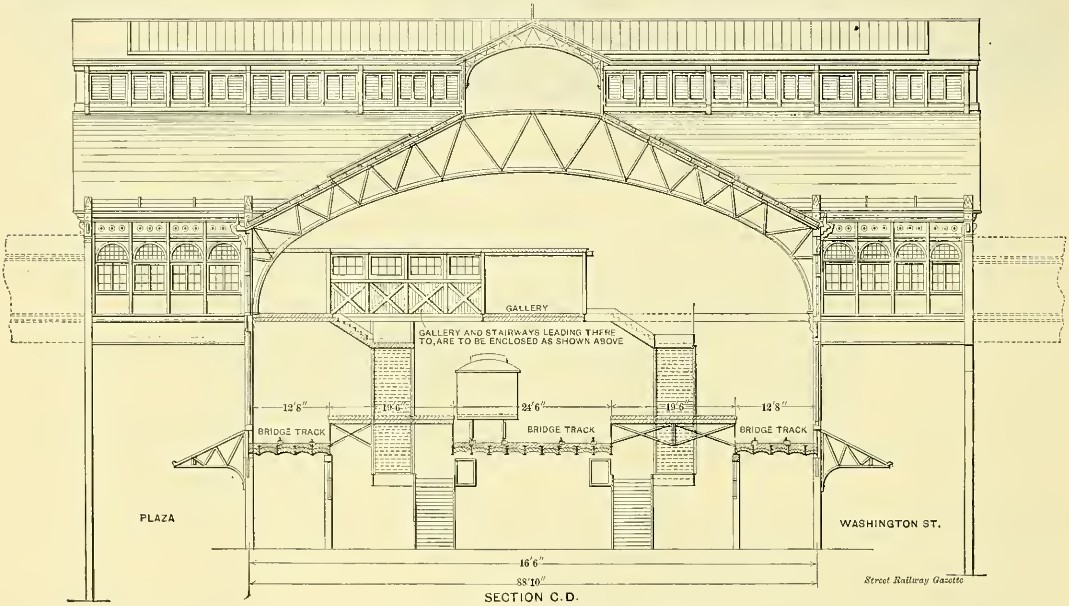


FIG. 7.—SECTION OF TERMINAL BUILDING.

Mr. Flynn, president of the company, expresses his confidence that the company will be able to complete its system through a stay pending an appeal and that eventually the franchises will be found to be without a flaw. He says if it is impossible to continue the work on the lines of the Nassau Company, the completion of those roads for which the Coney Island, Fort Hamilton & Brooklyn Railway Company has franchises, will be undertaken. These lines are valuable even without those of the Nassau Company, and will furnish important accommodations to the public. Even if the decision of the court shall be sustained, Mr. Flynn states that the effect will not be so widespread as has been assumed, as it concerns the right to build only on those streets for which the Union Street Railway Company desired to compete. These comprise about 30 miles of single track while the entire system which it is proposed to build includes about 100 miles of single track. One-third of the system therefore, is in doubt, and if the worst happens, a number of valuable and profitable lines can be operated and a large part of the present construction and equipment can be used.

Changes in Brooklyn.

Benjamin Norton, who was re-elected two weeks ago president of the Atlantic Avenue Railway Company, of Brooklyn, has resigned his office. In his letter of resignation he states that private business will occupy his attention for the next few months, and that while his relations with his associates in the board of directors have been entirely agreeable, the street railway business is not, he feels, entirely to his taste.

Mr. Norton had intended to resign before the strike in January last. It was deemed advisable, however, to postpone the action, and when the strike was declared Mr. Norton decided to remain until the trouble was over. It is probable that his experience in that connection has caused his distaste for the street railway business. Mr. Norton was the backbone of the strike so far as the companies were concerned, and to his firmness and shrewd policy the victory of the companies is largely attributable. His associates expressed their confidence in him and their approval of his policy by re-electing him. Mr. Norton was elected president of the road in 1893. Previous to that time he had been engaged in steam railway work. He has large interests in the street railway field outside of Brooklyn. H. M. Littell, general manager of the New Orleans Traction Company, has been elected as general manager of the Atlantic Avenue Company. He will assume the duties of his office July 1. During the month of June Mr. Ilsley, vice-president of the company, will probably be in charge.

Fraudulent Accident Claim Exposed in Indianapolis.

An attempt to swindle the Citizens' Street Railway Company, of Indianapolis, by a bogus personal injury claim was neatly exposed last week by the manager of the company, Thomas H. McLean. The conspirators are now under arrest and are likely to pay the penalty for their dishonesty. If the assertions of the police are to be believed, this is only one of a series of similar swindles undertaken by the prisoners with a view to defrauding street railway companies. They have been successful in several instances, it is alleged. It is doubtless true, thanks to Mr. McLean, that bogus accident claims in the street railway field will be to some extent decreased in number in the next year or two.

THOMAS H. McLEAN.

The attempted swindle was bold and sufficiently well planned, so there was good reason to believe that it would be successful. Three persons were interested in the plot: Barney Ginsberg, Joseph Stein and a young woman named Yetta Bachak, who, it appears from her story, was merely a tool in the hands of the two men. Ginsberg claimed to be her husband, but this story was subsequently proved to be false. It was he who made the claim on the Citizens' Street Railway Company for $1,500, as damages for injuries which he said his wife had sustained as a result of a street railway accident.

On April 25, Ginsberg and the woman, who, he claimed, was his wife, and a three-year old child, boarded a north Pennsylvania street car. Stein soon after boarded the car, but remained on the platform and did not recognize the others. At the corner of Talbot avenue and 7th street, Ginsberg, after signaling to the conductor, alighted with the child in his arms, followed by the woman. Just as she left the car the latter fell to the ground as if injured. The car had started again, but the conductor stopped it and took the names of the woman and her alleged husband and of Stein, who, apparently, did not know the other two.

A few days later, Ginsberg called at the office of the company and made his claim for damages. He stated that the car had been started just as his wife was leaving it and she had been thrown to the pavement and had sustained serious injuries. He threatened to bring suit unlesss the company paid the sum which he asked. He was accompanied by Stein who played the part of a disinterested witness.

Something in their manner aroused the suspicions of Mr. McLean, and while he agreed to consider the case, he was thoroughly convinced that a plan was on foot to defraud the company. The claim agent who visited the alleged victim of the accident, found her in bed with her arm tightly bandaged, but so far as his investigations extended, he was unable to find that she was injured. The company, in the meantime, received a report from an Indianapolis physician alleging that the woman had been severely injured. Whether he was imposed upon and made the report in good faith, or whether he was influenced to aid in the deception does not appear.

The company then sent physicians to make an examination, who reported that the woman's condition was entirely healthful and that her arm was not even sprained.

The discoveries were sufficient to convince Mr. McLean that it would pay to employ detectives to investigate the case. They learned that Ginsberg and the woman were not married and that Stein, instead of being the disinterested witness, was hand in glove with them. Their record was found to be very questionable. It was also discovered that Ginsberg had received money from two St. Louis street railway companies for alleged personal injuries, and that Stein had also victimized the two other companies in the same way. Upon this information, and the knowledge that the woman had not been injured, it was determined to cause the arrest of the three persons concerned in the plot.

When the two men visited the office of the company to secure a settlement, Mr. McLean temporized and urged Ginsberg to accept a less amount than that which he had originally claimed. The latter finally agreed to settle for $600. Upon this, the superintendent of police and the captain of detectives, who had been listening to the conversation, entered the room and took the men into custody and subsequently arrested the woman.

After her arrest, Yetta Bachak made a confession, giving the full details of the conspiracy. When the conspiracy was first broached she refused to take part in it, she alleged, but was subsequently frightened into acting the part of the victim of the accident. She said that she was taught the proper way to fall from the car, and was subsequently instructed to simulate great pain when anybody called to make an investigation of the case. The Grand Jury is investigating the matter, and it is probable that indictments will be found against all three.

Trolley Mail Service.

J. M. Masten, of the Postoffice Department in Washington, visited New York this week to complete an arrangement with the Metropolitan Railway Company to carry mail on the Broadway cable road. It is stated that a definite contract will be arranged probably within two weeks, by which six mail cars will be operated on the line. It is stated that the mail cars, in all probability, will be trailers attached to the regular grip cars.

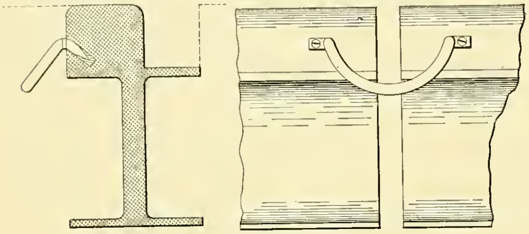
Mail will be carried to the three suburban postoffices by street cars in Des Moines after May 20. An effort is to be made to induce the Postoffice Department to place mail boxes on every street car. It is probable that such an arrangement would be found of considerable convenience to the public for the reason that all the street cars in the city pass the postoffice.

Six electric mail cars are now being constructed for use in Fall River. The cars are to be arranged like the regulation railway mail car and each one will be in charge of a mail clerk.

The new electric mail cars will be in operation in Philadelphia by June 1. All the details have been perfected at the postoffice for the new service, and the postmaster is only awaiting delivery of the cars by the company. The scheme of distribution is already mapped out, which includes the allowance of three clerks at $1,000 each taken from the classified service.

Novel Rail Bond.

A novel form of electric rail bond for which a patent has just been issued to James M. Faulkner, of Philadelphia, is illustrated herewith. The ends of the abutting rails are united by strips terminating in holes in the rail containing mercury. The holes are drilled in the side of the rail head with a downward and sideward inclination. Mercury is then placed in them to a suitable depth and the strips are driven in so as to enter the mercury and tightly close the holes. The patentee states that he does not limit himself to any special location for the holes. If the bond was to be placed in the position shown in the illustration, it would seem as if it would easily be forced off by wagon wheels.



RAIL BOND.

Death of Miss Julia Phelps.

The announcement was made on Tuesday of the sudden death that afternoon of Miss Julia Phelps, sister of the late George M. Phelps, whose death was chronicled in the GAZETTE of April 13 last. The Phelps family has been sadly afflicted during the last few months. Within that time the mother, brother, and sister-in-law of Miss Phelps had died, and it is hardly surprising that the repeated bereavements affected her brain. For some weeks she had been under the care of a trained nurse. On Tuesday, when the latter had left her charge for a few moments, Miss Phelps rushed to a window on the third story of the family residence and leaped headlong to the ground. Death was instantaneous. Miss Phelps was 49 years of age.

Proposed Consolidation in Pittsburgh.

It is announced that an important conference was held in Philadelphia on Thursday, at which the subject of the consolidation of the street railways in Pittsburgh controlled by the Widener-Elkins syndicate was discussed. Besides Messrs. P. A. B. Widener and William L. Elkins, there were present, it is said, Rufus E. Shapley, counsel for the interested companies; Chris Magee, of Pittsburgh; George W. Elkins, and other representatives of the Pittsburgh and Duquesne traction companies, and probably representatives of other companies. The main topic of discussion, according to the report, was first the consolidation of the Pittsburgh and Duquesne traction companies, which can be effected under the act which has just become a law, and secondly, the consolidation of most, if not all, of the Pittsburgh roads in one or two great companies.

Mr. P. A. B. Widener has declined to make a statement, on the ground that the matter was in an embryonic state. He said there is now a close contract between the Pittsburgh and Duquesne traction companies, and that until the act referred to was passed there was no law permitting a closer relation.

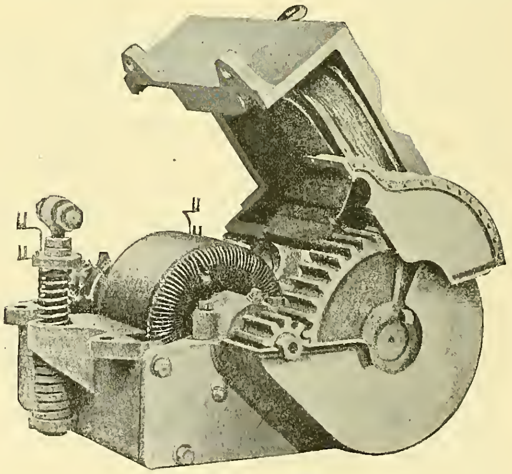
The Pittsburgh Traction Compnny operates the 11 lines of the Duquesne Traction Company under a contract and operates several of its own also. There are numerous other traction and passenger railway companies in Pittsburgh, some of which are controlled by interests friendly to the Elkins-Widener syndicate and which may be included in the consolidation, which will probably be effected in a short time.

Fencing in a Town.

A despatch from Cincinnati states that the town of Brombley, Ky., opposite the west end of Cincinnati, is being fenced with barbed wire by the South Covington & Cincinnati Street Railway Company, so as to prevent the people living there from using its cars, and to discourage outsiders from visiting the town on Sundays. The 300 people of Brombley are incensed over the move. The railway officials say they have taken this summary action in order to put a stop to the establishment of free gardens and troublesome resorts for Sunday visitors. They say they do not propose to haul the rough element of Cincinnati, Covington and Newport on Sundays, even if paid for it.

Thury Electric Railway Motor.

The electric railway which is to be constructed in Geneva, Switzerland, is to be equipped throughout with the Thury railway apparatus. The cars will be operated at a speed of eight miles an hour and will carry 26 passengers each. The motors are of 15 to 20-hp capacity each and are ironclad single reduction machines. The field magnet is of the familiar Kapp type, having four poles with only two coils. It will be seen from the illustration that it is an easy matter to open the motor case, as it is simply necessary to remove two bolts. The gear case requires no alteration preparatory to opening or after closing the casing. Connections from the lower field coil are facilitated by special clips shown in the illustration which fall naturally into place under thumbscrews when the motor case is closed. It would seem as if in the construction of the motor that ventilation was secured at the expense of protection to the upper field coil.



THURY MOTOR.

Street Railway Engineers.—IV.

JOHN H. ROBERTSON.

No street railway man in New York City is better known than John H. Robertson, superintendent of the Third Avenue Railway Company. He has earned his reputation by successful work that dates back to the days when street railway transportation in New York was of a comparatively primitive description. He entered the service of the Third Avenue Company in 1867, over a quarter of a century before the cable system was in operation on the lines. He was appointed master mechanic and superintendent of the repair shops in 1874, and in 1881 he was made superintendent of the Third avenue system. His work in connection with the installation of the cable system demonstrated his exceptional ability in the mechanical department of the railway. In 1887 the directors decided upon cabling the main line, but difficulties of various kinds arose to delay the improvement. It was not until 1891 that the obstacles in the way had been overcome; in March of that year actual work was begun. While superintendent of the railway and charged with the duty of operating it while the work was in progress, Mr. Robertson assumed a new burden of responsibility. He acted virtually as the company's consulting engineer, and in this capacity passed on the plans, those for the power houses, as well as those for the equipment of the cars, and the practical operation of the cable. He suggested a number of improvements for which patents have been granted, including grip trips, tilting sheaves, and car trucks. The Third avenue system to-day is beyond a doubt one of the most successful and best equipped cable railways in the world, and that this is the fact is attributable in no small degree to Mr. Robertson's practical experience and skill.

JOHN H. ROBERTSON.

Blockading Cars in Philadelphia.

The Electric Traction Company of Philadelphia has decided to stop, if possible, the common practice of blockading cars by teamsters in that city. Three men were arrested this week on this charge, on the complaint of the company. They have been held for examination under $500 bail, on the charge of maintaining a nuisance.

Consolidation in Toledo.

A deal has been effected in Toledo, O., by which the Toledo Electric Company, the Western Electric Company and the Toledo Consolidated Street Railway Company pass into the control of a syndicate headed by N. B. Ream and W. E. Hale, of Chicago. These men have controlled the Consolidated Street Railway Company. It was at first contemplated to absorb also the Toledo Electric Street Railway Company, but it is supposed the owners refused to make satisfactory terms. The capital represented in the deal is over $3,500,000. The Consolidated company owns 65 miles of electric railway and 145 motor cars. The officers are: President, Albion E. Lang; vice-president, Norman B. Ream; secretary, Charles L. Wright; treasurer, W. E. Hale; and general manager, W. S. Jewell.

Tramways Institute of Great Britain.

The quarterly meeting of the Tramways Institute of Great Britain was held in Hanley last month. The president, W. J. Carruthers-Wain, delivered an address referring to several matters of timely interest. There were, he said, a number of places where municipal authorities seemed to regard tramways as their natural enemies. This was due, he thought, to a misunderstanding, and he was quite sure that if the two opposing parties were to meet more frequently and discuss their affairs calmly and reasonably, the results would be much more satisfactory. A very little encouragement from local authorities would add considerably to the convenience of the public in various districts. He referred to the report on the conference of the parliamentary committee on light railways and said that there had been a strange delay in the introduction of the promised bill to facilitate the construction of these railways. He believed that a relaxation of the restrictions on tramway enterprises would enable companies to extend the facilities already given, would encourage enterprises, and would be the best means of dealing with the light railway problem, of which there had been so much discussion of late. The ideal light railway was one for which no purchase of land was necessary, as it should be constructed along the public roads. The opposition of the owners of frontage should be overruled if the road was shown to be one of public utility. The road should carry passengers as well as freight, and the local authorities should be empowered to provide capital for the formation of the line. Limitations as to speed should be relaxed, and the only thing compulsory should be an efficient practicable brake.

Several members then discussed the matter of municipal ownership. It was argued that it was impossible to stem the tide of popular movement toward municipal purchase, and the president evidently expressed the opinion of the members when he said that it seemed best to make terms with their adversaries and not to fight to the last minute and then ask for consideration.

Receiver for the Milwaukee Company Applied For.

It is announced that an application has been made to a court in Milwaukee for the appointment of a receiver for the Milwaukee Street Railway Company. Interest on the bonds of the company has been defaulted, but the bondholders, some time ago, agreed to waive their claims for the present. As the Milwaukee Street Railway Company is the chief asset of the North American Company, it was rumored that it was likely to go into litigation, but the report has been denied.

Street Railway Gazette.

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AS THE ONLY WEEKLY PUBLICATION in the world DEVOTED TO THE STREET RAILWAY INDUSTRY, and the only journal adequately treating THE NUMEROUS TECHNICAL FEATURES INVOLVED IN ITS MODERN DEVELOPMENT AND PRACTICE, the "Street Railway Gazette" aims to worthily represent the activity and progressiveness of the important interests to which it is devoted. Presenting ALL THE NEWS EVERY WEEK, and describing CURRENT IMPROVEMENTS AND DEVELOPMENTS immediately upon being brought forward, its pages offer to those engaged in the street railway field the TIMELY ADVANTAGES ENJOYED IN OTHER ACTIVE AND IMPORTANT BRANCHES OF MODERN INDUSTRY, and to advertisers A LIVE AND ENERGETIC MEDIUM commensurate with their needs and one giving CLOSEST ACCESS TO THE COMMERCIAL OPPORTUNITIES OF AN EXTENSIVE AND GROWING BUSINESS.

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FAIR TREATMENT NEEDED.

The presiding officers of the British Tramways Institute at a recent meeting made the remark that judging from the attitude of municipal authorities one might be inclined to regard street railway companies as public enemies. The statement is susceptible of a wide application. It is as true in the United States as in England. Just now a pertinent illustration may be found in Brooklyn. The municipal authorities are seeking every means to attack the companies, and are inspiring mass meetings at which the latter are denounced. And yet no one denies that the transportation companies of Brooklyn, so far from being public enemies, have contributed the largest share toward the recent prosperity of the city. It is true that an unfortunately large number of accidents have occurred in the city, but for exceedingly few of them can it be proved that the companies were directly responsible. At present the city authorities are following a policy that is not calculated to improve the street railway service. They have reduced the speed of the cars to that of the old horse railway schedules, and have sought to interfere with the companies' usefulness in every way. Improvement on the street railway situation cannot be expected until the authorities are disposed to accord the companies fair treatment.

SURFACE AND ELEVATED RAILWAYS.

The competition of the surface lines in New York City continues to make inroads on the receipts of the elevated railways. The gross income of the Manhattan Elevated Railway for the quarter ending April 1, shows a decrease of over $135,000 compared with the receipts of the corresponding period of last year. At the same time the operating expenses have increased several thousands. After the quarterly dividend had been paid there was a deficit of $2,450, while last year the surplus at the end of the quarter was $105,000, and the previous year it was $276,000. On the other side of the bridge, however, a different state of things exists; the earnings of the Brooklyn Elevated Railway, compared with those of last year, are gaining at the rate of $1,000 daily. The explanation is simple; the gain represents an equal loss on the part of the street railway companies. Since the new regulation decreasing the speed of electric cars went into force, the traffic has been steadily decreasing and the weekly loss on the Brooklyn Heights system alone is said to reach $3,000. It seems to be an obvious conclusion that the public requires rapid transit. If it can be obtained on the surface cars, they will be liberally patronized at the expense of the elevated railways, but if not, the latter will prove far more popular.

NEW YORK AND BROOKLYN BRIDGE TERMINAL STATIONS.

The cable railway on the New York and Brooklyn Bridge, which is a little over a mile in length, carries daily about 225,000 passengers and during the busiest hours 500 persons are transported from one city to the other every minute. As the line has only two stations, one at each end, there is an exceptional need for good terminal facilities. At the present time the provision in this respect is lamentably inadequate. The platform space in the terminals is so limited that there is imminent danger that persons will be crowded off in front of trains. Should a panic occur on the New York side in the evening when the traffic is starting toward Brooklyn, the consequences might be exceedingly serious. The only protection against danger is a line of stalwart officers whose energies are directed toward keeping the crowd in motion and in saving women and children from the consequences of the mad rushes when the train gates are opened. When the journey across the bridge is completed, the passengers must face new discomforts on the Brooklyn side. Here the crowd scatters in various directions and the passenger is pushed and crowded until he finally leaves the bridge structure. It is a matter for congratulation that work on the terminals is now well under way; the station on the Brooklyn side will probably be thrown open to the public within the next three or four months. When the improvement is completed, trains will be dispatched at much shorter intervals than is now possible and the facilities will be sufficiently ample so that danger and discomfort will not be incidents of travel on the bridge.

FRAUDULENT ACCIDENT CLAIMS.

It is always a great satisfaction to chronicle the fact when a rascal is caught in an attempt to defraud a street railway company by a fraudulent accident claim. There seems to be no reason to doubt that quite a number of persons are busily engaged in the interesting practice of defrauding transportation companies in this way, and the latter seem to be waking up to the fact. The swindlers have various ways of attacking the companies, and they seem to be quite successful both in securing money and in keeping out of the clutches of the law; for even in suspicious cases there is a tendency on the part of the companies to compromise in order to ward off the possibility of a law suit, as juries are proverbially inclined to decide against corporations, regardless of the merits of a case. It is a gratifying fact, however, that swindlers of this class are occasionally brought up with a sharp turn. A case of this kind has just come to light in Indianapolis. To Mr. McLean, the manager of the street railway company in that city, are due the thanks of the street railway fraternity for his skillful work in putting an end to the pernicious activity of a trio of scoundrels of this class. In this case a woman pretended to be injured by a fall from a trolley car which, it was alleged, had been started too soon; the leader in the plot who passed as her husband, made a fraudulent claim for substantial damages for his wife's injuries. His story of the accident was substantiated by the third swindler, who played the part of the reliable and disinterested witness. Their roles were not sufficiently well assumed and suspicion was aroused. Detectives were put on their track with the consequence that the trio have been placed under arrest. This is the third notable case of this kind which has been brought to light within the last three or four months. In two of them the plan of attack was more dangerous than that undertaken in Indianapolis, as in both these instances the alleged victims of street railway accidents simulated so perfectly the symptoms of disability resulting from injuries, that even physicians were imposed upon. The result of the exposure in Indianapolis, however, promises to be more satisfactory than that which followed in the other two cases, as there is a strong probability that the swindlers will be amply punished. Mr. McLean, by giving the widest publicity to the exposure, has earned the thanks of the street railway fraternity, for swindlers of this class thrive on suppression of facts. We trust that other managers who discover frauds of this sort will follow Mr. McLean's example and thus put companies generally on their guard.

Anti-Trolley Meeting in Brooklyn.

A mass meeting was held in Brooklyn, last Wednesday evening, to protest against the manner in which the electric cars are operated in that city. Speeches were made denouncing the companies because cars had been operated at so high a rate of speed that human life had been endangered. Complaints were also made that at the present time the speed was so slow that the convenience of the public was not promoted. For the most part the speeches did not advocate any method for the improvement of the service, but were, in the main, denunciations of the companies and their officers. Resolutions were adopted criticizing the companies for their failure to provide cars with effective fenders.

Meeting of the Executive Committee of the American Street Railway Association.

The executive committee of the American Street Railway Association met at the Waldorf Hotel, in New York City, last Wednesday, to make arrangements for the annual convention to be held in Montreal in October. The following were present: Joel Hurt, president, Atlanta; W. Worth Bean, first vice-president, Benton Harbor, Mich.; John H. Cunningham, second vice-president, Boston; Henry C. Payne, Milwaukee; Judge W. H. Jackson, Nashville; Granville Cunningham, Montreal; D. G. Hamilton, Chicago; John N. Partridge, Brooklyn. A committee consisting of John H. Cunningham, W. H. Jackson, and W. Worth Bean was appointed to prepare resolutions on the death of William J. Richardson, secretary and treasurer of the association. The report of the committee deploring the death of Mr. Richardson, a wise and faithful officer of the organization, was adopted. There were several candidates mentioned as Mr. Richardson's successor. Among those who expressed themselves willing to accept the position were W. Worth Bean, of Benton Harbor; H. I. Bettis, of Atlanta; T. C. Pennington, of Chicago; and C. B. Fairchild, of New York. After some discussion the committee decided that for the present it was advisable to maintain the office of the secretary and treasurer in Brooklyn, and Miss Strickland, Mr. Richardson's assistant, will be in charge. John N. Partridge, of Brooklyn, was appointed as a sub-committee to sign checks as secretary and treasurer. The committee considered subjects for discussion at the convention, and the topics will soon be announced. It was decided to recommend amendments to the constitution and by-laws, by which the scope of the association may be enlarged. It was also decided to set apart, during the convention, forenoons for executive sessions and afternoons for open sessions for the discussion of street railway matters.

Peculiar Case of Magnetization.

To the Editor of The Street Railway Gazette :

Sir:—I have had a peculiar case of magnetization brought to my notice, and would like to present it to your readers for their consideration. Four switch levers are arranged in a switch house at the crossing of an electric line with a double track steam road. We have a grade crossing on our road (the Ashland & Catlettsburg Electric Railway) at West Catlettsburg, over the Chesapeake & Ohio Railway tracks, and for precaution the latter company has put in an electrical block system. There are four signal towers, each 30 feet high, two dwarf signals, and two derailing switch points placed in our tracks, one on each side of the crossing. The 30-foot signals are placed two on each side of crossing, viz., the red or danger signals at a distance of 250 feet away, while the green or caution signals are each located 1,300 feet, respectively, from the crossing. The levers in the switch house are connected to the signals, as follows: One lever operates the two dwarf signals and the two derailing switch points; one lever handles the two danger or red signals, while the caution or green signals, being at a greater distance from crossing, are each operated by a separate lever. These levers extend four feet above the floor of switch house and some distance below, and are magnetized continually but not to the same degree; the intensity is stronger in the morning and evening. The upper ends indicate a north polarity, while the lower ends below floor are of south polarity. The levers are supported by a heavy cast-iron frame and floor plate through which the levers extend. Only four levers are used, although provision is made for the use of seven if necessary. I attributed the phenomena to waste currents, although such a conclusion seems hardly probable, considering the excellent facilities enjoyed by our road for conveying the return current to the power house, in Ashland, a distance of five miles from the crossing. The road parallels the Ohio River the entire distance between Ashland and Catlettsburg. There are heavy ground plates or castings placed in the bed of the river and below the low water line at each end of the road, one being placed at the power house, while the other is near the crossing. There are also three ground plates sunk in the beds of creeks or branches emptying into the river, at about equidistant points along the road. All these ground plates are connected to the tracks by No. 0 copper wire. In addition each joint of track is bonded by two No. 4 copper bonds, with cross connections every 60 feet. Our road is single tracked, with 50-pound T-rail, while the steam road is double tracked with 90-pound T-rail. The electrical part of the block system for locking the lever that operates the derailing switches after a train enters the distant end of the block is just being put in, hence it could not produce the magnetizing effect. I have given all obtainable data by which your readers may be enabled to reach a conclusion, and hope that a solution may be found.

H. Wellman,
Superintendent A. & C. Street Railway Company.
Ashland, Ky.

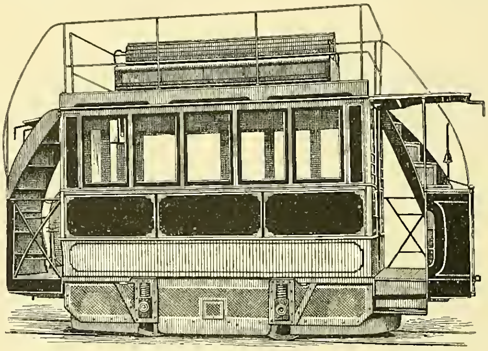
Gas Motor in Dresden.

William S. Carroll, United States Consul-General at Dresden, has been greatly interested in the operation of the gas motors in use in that city. In the consular reports the success which has attended this method of street car propulsion has been frequently referred to. In the last report, issued by the State Department this week, appears a description of the new type in Dresden, which, Mr. Carroll says, is an easy, manageable, economical motor. The objections which were apparent on the first trial have, he writes, been overcome. The following description is taken from his report: This car weighs about 12,127 English pounds. The distance between the wheels is about 5 feet 2 inches, and the length of the car frame is about 11 feet 5 inches. There are 14 inside seats, 10 on both platforms, and 12 on the top of the car, making a total capacity of 36 seats.

The car has a gauge of about 4 feet 7 inches, and has the appearance of an ordinary street car, excepting the two folding doors in the centre of one side of the car, which cover the driving wheel.

The motor has a capacity of 10 horse-power, with two cylinders, which are placed in line under one of the rows of seats, one on each side of the shaft.

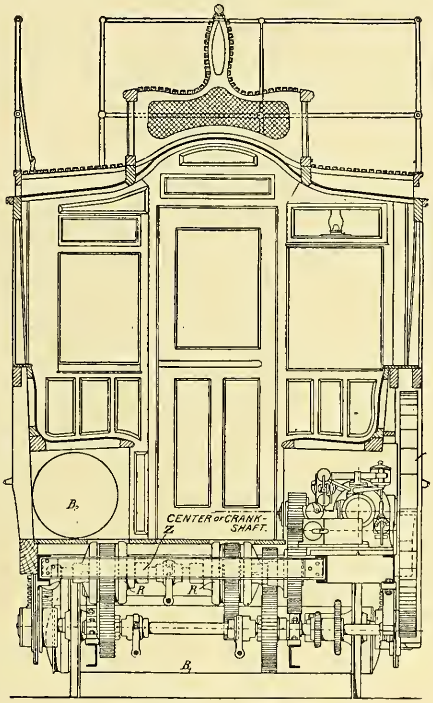
The gas in the machine is ignited by electricity without any noise. Two cylindrical gas tanks are fixed parallel with the axles of the wheels under the floor of the car; a third gas tank is placed lengthways under the row of seats opposite the machinery, and serves as a proper balance to the car. These three gas tanks hold about 0.95 cubic metre (33.55 cubic feet) of gas and weigh about 250 kilograms (551 pounds). The water used in cooling the cylinders circulates automatically through copper tubes eight-tenths of a millimetre (0.0315 inch) thick which run from the top to the bottom of the car in a spiral shape. The water, when heated, rises to the top of these tubes, where it cools and then flows back into the gas cylinders. The tubes are concealed under the seats. The gas tanks are covered by plates. No part of the machinery is visible inside of the car. It is only accessible from the outside by opening the two large doors above mentioned and a number of smaller doors. The car, while in motion, is noiseless, and there is no odor from the gas.



MOTOR CAR.

The driving gear consists of four shafts. The motor shaft is driven directly by the gas motor and transmits the motion by means of geared wheels on the shaft. On this shaft there is a peculiar friction coupling, as shown in the cross-section view of the machinery.

This friction coupling regulates the speed of the car by means of a reversing lever connecting a larger or smaller spur wheel, as may be desired, with the other parts of the machinery. Both wheel axles are driven by chains and chain wheels which run in oil, so as to use the entire adhesive weight of the car for the development of the tractive power. During short stops the machine remains in motion. By means of a lever the machinery is thrown out of gear to stop the car; while out of gear the motor uses very little gas, because the number of revolutions is diminished, and only after every eight or ten rotations a new ignition of the gas occurs, which is sufficient to keep the motor in motion. One of these levers is connected with the friction coupling and serves to diminish or increase the speed of the car from 150 to 240 rotations per minute; the other lever is directly connected with the motor and controls the movement of the car forward or backward.



SECTION OF MOTOR CAR.

The levers and brake handles are easily removed from one platform to the other as may be required when changing the direction of the car.

The wheels of the car are peculiarly fastened to their axles. One wheel is secured to the axle, while the other can slip in its hub in the proportion of 80 per cent. of the circumference of the axle toward the neighboring wheel until it is necessarily taken along by the rotation of the axle. Thus, both wheels can revolve differently when the car takes a curve, and the friction or resistance caused by the curve is greatly diminished.

The speed obtained at the trial trip was at the rate of 14 kilometres, or about 8.7 miles, per hour. All curves were overcome with ease, and without any swaying or jerking motion, the smallest radius being 15 metres (49.2 feet). The speed was diminished while passing over the curves. The consumption of gas amounted to about one-third of one cubic metre (11.74 cubic feet) per kilometre (0.621376 mile), one cubic metre (35.316 cubic feet) of gas costing 12 pfennigs (2.86 cents). The average cost of gas per kilometre, or 3,280 feet 10 inches, would be 0.04 pfennigs (0.95 cent). The gas used for the motor is under a pressure of six atmospheres, and the manometer shows at all times the amount of gas consumed. The compressed gas enters at first into a regulator for gas pressure (Pintsch system), where the pressure is reduced from 30 to 40 millimetres (1.18 to 1.57 inches) water pressure. The gas contained in the three gas tanks, viz., 0.95 cubic metre (33.35 cubic feet) is sufficient to run the car 17.1 kilometres (10.63 miles).

The gas supply station consists of an 8-hp gas motor, which runs a force pump with a capacity to compress about 60 cubic metres (2,118 cubic feet) of gas to eight to ten atmospheres per hour. The gas is taken from the city gas pipes in the street, and the tanks in the cars are filled by using rubber tubes or hose; they can be filled in about 30 seconds. The cooling water must be removed from time to time, but not so often as the gas. This is done by means of water taps at the filling station. In extreme cold weather, a little glycerine is used to prevent the water from freezing.

It is estimated that a car like the one described can be built and fully equipped for about 15,000 marks ($3,570). This estimate is based upon the price of labor and materials in Germany and on the theory of manufacturing on a large scale. It is impossible now to fairly estimate the average life of a car or the annual expenses for repairs. This system of motor power is attracting wide attention, and many German cities are adopting it for street cars. Trials are proposed to be made with gas locomotives for narrow-gauge railways and for shunting purposes at railway stations.

Decreasing Operating Expenses.

The Boston *News Bureau* gives the following figures relating to the New Haven street railways, as showing the decreased operating expenses which are accompanying increasing gross earnings upon the street railways: Amount of coal used year ending April 12, 1894, 2,139 tons; mileage, 659,598—pounds per mile, 7 26-100; amount of coal used year ending April 11, 1,789 tons; mileage, 843,654—pounds per mile, 4 75-100; total cost of station first thirteen weeks 1894, $3,493; mileage, 154,411; cost per mile, .0226; total cost of station first thirteen weeks 1895, $3,572; mileage, 193,392; cost per mile, .0184. During this time the gross earnings of the New Haven Company were for the first three months in 1893, $29.799; 1894, $41,047, and 1895, $39,705.

Strike in Carbondale.

Sixty conductors and motormen employed by the Lackawanna Valley Transit Company went on a strike last Sunday. The strike grew out of the discharge of four men who were working for an organization to which all the employees belonged. The strikers interfered with the operation of the road by placing obstacles on the track and by spiking the switches. No trouble was found in filling the places of the strikers, as the company had a considerable number of applications for employment on hand.

Comments and Views of Contemporaries.

Accidents on Street Railways.—The greatest amount of electric car fatalities is among children, and it is not to be wondered at when the prevalence of children in large cities and their thoughtlessness is considered.—*Newburyport (Mass.) News.*

Speed of Electric Cars.—It ought to be impossible for motormen, no matter how reckless, to make a speed of more than eight miles or nine miles an hour. The people want rapid transit, but they do not want express train transit on the streets, and they prefer safety to the saving of a few minutes on a given trip. The disregard by the employes of the rule requiring the cars to be brought to a dead halt 25 feet from the railway tracks is notorious. This is a criminal matter, and it will result, if persisted in, in a tragedy which will land somebody behind the bars of a prison.—*Syracuse Herald.*

A Rule That Works One Way.—When a soulless corporation, by building a railway, or otherwise investing capital, improves a man's property, the said man never thinks he is called upon to contribute even a percentage of the gain to the corporation. But when his property is in any way injured he expects not only full compensation for damages, but also additional compensation for annoyance caused. However illogical and inconsistent this may be, it is certainly in accordance with both law and usage, and no departure from the policy should be thought of, even with so indispensable a nuisance as an elevated railway through a great city.—*St. Louis Republic.*

Unfair Criticism.—References to the street railway companies and to some of the other corporations that are proving powerful aids to the city's growth and progress, indicate that they are regarded as public enemies against whom the sentiment of the people should be arrayed. If it was not desirable for the city to have street cars, franchises should not have been given to the corporations. What would Toledo be without street cars? Having given to the street railway companies certain franchises, why not treat them with justice and fairness? Why seek to create prejudice against these interests? Fault finding with the men and the corporations that promote the welfare of the city, is one of our worst faults —*Toledo Commercial.*

To Meet Electric Railway Competition.—Instead of going to the legislature and demanding that the building of electric roads be stopped, as the New Haven road is doing in Connecticut, the steam lines of Massachusetts are preparing to meet electric competition in the way any other business would meet competition—by lowering rates and improving accommodations. Inquiries at the offices of the leading lines centering at Boston show that reductions of fares for the summer travel are very generally contemplated for suburban travel, in view of the extension of electric lines, and the president of the Boston & Maine says that if local fares out of Boston are reduced the rates for long distances will be cut in proportion. That is the way to face the invasion of the trolley road. The two kinds of railway occupy different fields, to a large extent, and within reasonable limitations there is business enough for both.—*Springfield Republican.*

Street Railway Tracks.—The president of a leading company says: "We have found out by experience that we cannot make our tracks any too heavy or any too strong. The wear and tear is something fearful, as the condition of our tracks attest; that is, of the older ones. Up to a year or so ago we did not know how to build a substantial track. We are learning fast, and I think that the tracks now being laid will give us good wear. Low joints will bob up here and there, but they will not be as numerous as in times gone by. What puzzles us is the length of life of a rail. We have found out, almost to a certainty, the life of a rail on a cable road. That kind of traction is not very extensive and is fast disappearing, so there is no benefit to be derived from studying statistics of a system that comparatively few companies are using and is being discarded. In my opinion an electric rail, if well and substantially laid, and some care bestowed on the roadbed thereafter, with cars on a five-minute headway, will last at least 20 years. This is not a wild guess or a random assertion, for I have been in the railway business in this city about as long as the next one, and know whereof I speak. I know that opinions differ on the life of a rail; some of these opinions are so preposterous as to make them appear biased."—*St. Louis Globe-Democrat.*

Notes from Foreign Papers.

L'Electricien announces that a company composed of Parisians has applied for a franchise to operate an electric railway in Nantes. The company asks the privilege of running cars on streets which the Compressed Air Company, of Nantes, has considered to be impracticable to use for street railway lines because of steep grades.

The *Elektrotechnische Zeitschrift* states that opinions vary as to the matter of interference with physical laboratories by the operation of electric railways. It states that the matter is one that should be investigated. The technical committee of the Elektrotechnischer Verein is making experiments to determine the changes in the magnetic field caused by electric traction.

In the *Railway World* for May, H. Conradi discusses compressed air motors for tramway traction. This is the first of a series of articles. The author describes several early designs for compressed air motors. In the same paper appears an article on "Tramway Management." The steam locomotive is discussed at some length. It is stated as the conclusion that the simple electric railway type of locomotive is the most successful motor used on tramways to-day for service of ten minutes or more frequency.

The *Journal of the Institute of Electrical Engineers* gives an abstract of a recent paper of Mr. Wuilleumier, on the surface contact electric railway system used at Lyons. The motive power is obtained from gas engines run with power gas; the results of some tests are given showing that with ten cars at work the consumption of coal was from two to 3.5 pounds every kilowatt hour; the cost of the system is said to compare well with the overhead trolley system.

In *Engineering*, of London, April 26, Mr. Dawson, in his serial on electric traction, gives a well-illustrated description, including dimensions, of several of the prominent American and European motors.

In *L'Industrie Electrique* for April 25 Mr. Boistel gives tabular data for five Swiss mountain roads, three of which are operated electrically, one by steam (Pilatus) and another by a water counter-weight (Lanterbrunnen), and compares the results. It appears that the cost of construction of the electrical lines is about one-third of that of the others. the cost of operation from one to two-thirds, the weight of the trains from 40 to 63 per cent., and the fare 60 per cent.; the results, therefore, show, in a striking manner, the great superiority of electric traction for steep grade mountain roads. The same paper gives a summary of the data for the experimental roads at Hagen and Vienna in which the alkaline accumulator is used.

Cable Railway to be Sold.

An application was made to Vice-Chancellor Emory in Newark, on May 14, for an order authorizing the receiver, Eugene Vanderpool, to discontinue the operation of the Orange Mountain Cable Railway. It was shown by a report that the running expenses of the road exceeded, by $10, the amount of the receipts. The court granted the motion and ordered the receiver to sell the road on account of the bonded indebtedness of $350,000. The total liabilities of the company are $777,939, and its assets are estimated at $180,955. The sale is to take place within two weeks.

Electric Railway in Paris.

An electric railway is to be constructed in Montmartre, Paris. It was originally proposed to build a cable road, but it was abandoned after a commission examined several electric conduit systems, notably those in Budapest and Washington. The fare on the railway will be 2 cents, except during the hours when workingmen go to and from their work, when it will be reduced to 1 cent. The road is to be equipped with electrical apparatus constructed in France.

Pennsylvania Street Railway Legislation.

Three street railway bills of importance passed the Pennsylvania Legislature this week, and are now awaiting the Governor's signature. The most important of these measures authorizes companies to make contracts with each other for the sale, lease or operation of their properties and franchises. An amendment to this measure provides that "nothing herein contained shall be considered as authorizing any traction or motor power company to acquire, lease or operate so much of the line of any other motor power company which occupies any township, borough or county road." In addition to permitting the consolidation of traction companies and their leased, operated or controlled lines by lease or purchase, the bill authorizes companies to enter into contracts with other companies for the operation of lines of railway. The second bill authorizes street railway companies to lease or sell all or any part of their property and franchises to traction companies and to make contracts for their construction, equipment and operation, the cost to be paid by mortgage bonds or otherwise. The third bill permits companies owning, leasing or operating lines to organize them as a general system and to make extensions over streets occupied.

Switchboard Frame.

The switchboard frame which is shown in diagram, Fig. 1, is constructed in parts which may be easily assembled. The frame was originally designed for a switchboard composed of 15 sections of uniform size. The frame can be "knocked down" for shipment and boxed in a comparatively small space; this fact is of no small importance in shipping from points where frame and boards are made to the plants where they are to be in use. The frame is made of T and angle iron; the legs or bottom pieces can be made any desired distance from floor; the frame can also be extended any desired distance from wall. "T"-shaped iron pieces to which the sections of board are bolted are so made that they fit over the T-iron braces. These braces are wide enough so that the necessity of drilling the slabs at points near the joints is avoided. When a more finished appearance is desired, the board is placed on pillars such as those shown in Fig. 2. In this case, the T-iron extends through the centre of the pillar and is sunk in floor. The pillars are usually made of iron, marbleized to match the board or nickle-plated, and in some cases are made of cast brass. The frame was designed by T. J. Murphy & Company, of New York City.

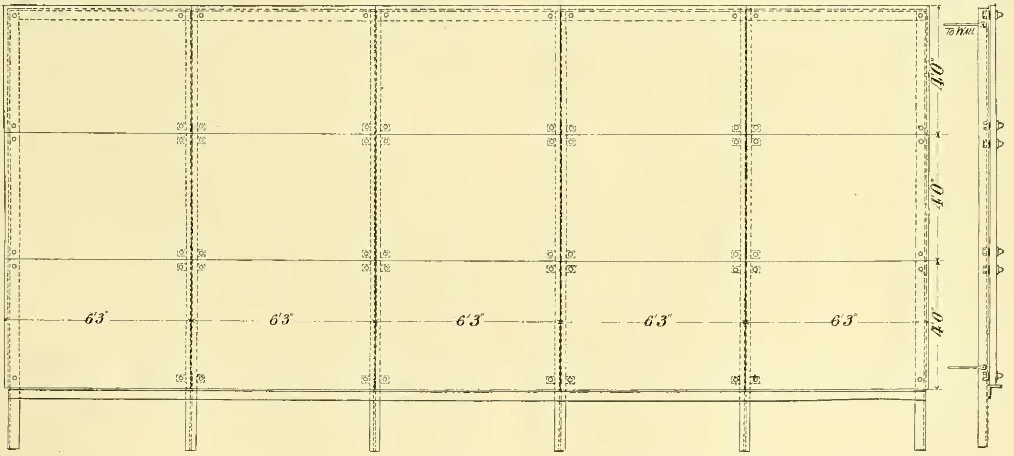


FIG. 1.

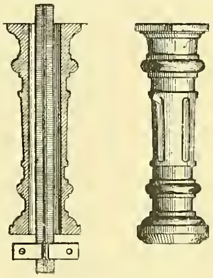


FIG. 2.

FINANCIAL NOTES.

WACO STREET RAILWAY SOLD.—The Waco (Tex.) street railway and electric light plant have been sold under an execution to Henry C. Scott, of St. Louis, for $60,000.

MATHER ELECTRIC COMPANY.—Judge Thayer has appointed Charles M. Jarvis, president of the Berlin Iron Bridge Company, permanent receiver of the Mather Electric Company. Up to this time Mr. Jarvis has been temporary receiver.

GENERAL ELECTRIC ANNUAL MEETING.—At the annual meeting of the General Electric Company, in Schenectady, this week, George P. Gardner and T. K. Cummings, both of Boston, were elected directors to succeed Messrs. Twombly and Mills.

WORCESTER & SUBURBAN STREET RAILWAY.—At a meeting of the directors of the Worcester & Suburban Street Railway Company last week it was voted to declare a dividend of $3 per share on June 10. An order was received from the railway commissioners approving the issue of $200,000 bonds voted by the stockholders in March.

BALTIMORE TRACTION EARNINGS.—It is stated that the earnings of the Baltimore Traction Company for the month of April showed a net gain, compared with April, 1894, of about $10,000 The gross earnings increased $7,500 during the month, but economies introduced in the operation of the system effected a saving of $2,500, thus making the net increase the amount stated.

REPORT OF THE CONEY ISLAND & BROOKLYN RAILWAY —The quarterly report of the Coney Island & Brooklyn Railway Company, just filed with the railway commissioners, shows a considerable improvement in earnings. The gross earnings for the quarter were $73 677, against $49,679 last year. The operating expenses for the quarter were $57,491 against $44 611. Net income, $4,135, against a deficit of $8,549.

OSWEGO STREET RAILWAY.—The following directors have been elected by the Oswego Street Railway Company: President and treasurer, George F. Ells; vice-president, D. L. Cough; secretary and superintendent, F. E. Pritchard. The company is still in the hands of a receiver. Mr. Ells is quoted as saying that he did not think the road would be a paying investment until its tracks had been extended.

MANHATTAN ELEVATED REPORT.—The report of the Manhattan Elevated Railway, of New York, for the quarter ending March 31 shows these figures: Gross earnings, 1895, $2,426,479; 1894, $2,560,755; operating expenses, 1895, $1 407,082; 1894, $1,398,573; net earnings, 1895, $1,019,397; 1894, $1,162,182; surplus, 1895, $447,550; 1894, $555,761; dividends, 1895, $450,000; 1894 $450,000; deficit, 1895, $2,450, surplus, 1894, $105,761.

RUMORED DEALS IN PITTSBURGH.—P. A. B. Widener and W. L. Elkins, made a visit to Pittsburgh last week and inspected the power houses and improvements of the Pittsburgh and Duquesne Traction Companies. Their visit gave rise to rumors that the Second Avenue Traction Company and the Pittsburgh Traction Company were to secure control of all the street railways in Pittsburgh and Allegheny. Mr Elkins, when asked about the subject, said that there was not the slightest foundation for the report.

EAU CLAIRE STREET RAILWAY IN RECEIVER'S HANDS.—Judge Jenkins, of the United States Court, has appointed George B. Wheeler receiver of the Eau Claire Street Railway, Light & Power Company. Suit for the appointment of a receiver was brought by the Atlantic Trust Company, of New York, which holds bonds aggregating $400,000. The receiver is the president and general manager of the company. The company owns about eight miles of track on which 13 motor cars are operated.

EARNINGS OF THE WEST END, BOSTON.—Gross earnings of the West End Street Railway Company, of Boston, are said to be increasing at the rate of $1,000 to $1,500 per day, and the gain is nearly all net profit. The company is said to have nearly $1,000,000 in bank, no debts, and the management will shortly take up the question of an extra distribution to the common stockholders above the 6 per cent. now paid. All construction is being paid for out of earnings, this in itself requiring a heavy outlay, but the returns are said to justify the expenditures for new electrical equipment, etc.

RUMORED CONSOLIDATION IN BALTIMORE —Rumors of consolidation of the rapid transit lines in Baltimore have recently been revived. President Perin, of the City & Suburban Company, is quoted as stating that he favored the consolidation, but was unable to give any information concerning a definite plan. He expressed the opinion, however, that the last had not been heard of rapid transit consolidation in Baltimore. With all the lines under one management, he thought the operating expenses would be greatly reduced, as the duplication of mileage road traffic could be avoided and a system of transfers could be arranged, which would greatly increase the business.

PHILADELPHIA & WESTCHESTER TRACTION COMPANY'S INCREASE IN STOCK.—The directors of the Philadelphia & Westchester Traction Company have decided to recommend an increase in the company's capital stock to an amount not exceeding $400,000. The company will absorb the Delaware County & Philadelphia and Castle Rock & Westchester Passenger Railway Companies and will construct an electric line to Westchester. The Delaware County Company is now constructing its line on the Westchester turnpike at the rate of 2,000 feet per day. It has met with difficulties in the way of securing rights to erect poles, and if these obstacles are not overcome, it is stated that steam dummies will be used temporarily on the line.

REPORT OF THE ATLANTIC AVENUE RAILWAY COMPANY.—The quarterly report of the Atlantic Avenue Railway Company, of Brooklyn, just filed with the railway commissioners, shows the extent to which the company suffered by the strike of its employees in January last. There is a deficit of $135,607, against a surplus of $15 912 last year. The following are the combined figures of this company and the West End Street Railway Company for the last quarter and the corresponding quarter of last year: Gross earnings, 1895, $142,572; 1894, $216,502; operating expenses, $214,112; 1894, $158,909; net earnings, 1895 (loss), $71,540; 1894 (surplus), $57,573; other income, $10,541; 1894, $16,215; gross income, 1895 (loss), $60,999; 1894 (surplus), $73,808; fixed charges, 1895, $88,847; 1894, $70,017; 1895 (deficit), $149,846; 1894 (surplus), $3,791.

SALE OF DALLAS RAILWAY.—The Dallas Consolidated Traction Street Railway property was disposed of May 7 at public sale, by the special master in chancery, Charles Fred Tucker, at foreclosure of the first mortgage bondholders to satisfy an indebtedness of $250,000, with interest to the extent of about $4,000. The property was bid in by Frank P. Clark, of Baltimore, attorney for the first mortgage bondholders, for $190,000. J. C O'Connor, of the City National Bank, bid against Mr. Clark, running the property up to $185,000 The property consists of the Main street line, the Fair Grounds extension and the college extension, the McKinney avenue line, the Neltie street line and Akard street and Ervay street lines. These lines aggregate 27 miles of track. In addition to the track, rolling stock, mules, stables, power houses, etc., 17 pieces of realty were sold with the road.

REORGANIZATION OF THE PENNSYLVANIA AND MARYLAND STEEL COMPANIES —In accordance with the plan of reorganization, the receivers of the Pennsylvania Steel Company, which concern holds all of the stock of the Maryland Company, on Wednesday last offered the entire property of the company at public auction at the Philadelphia exchange. The property was bought in by Effingham B. Morris on behalf of the reorganization committee, of which he is chairman, for $2,000,000, the amount of the bonded indebtedness Mr. Morris was the only bidder. Application will shortly be made to the State Department, at Harrisburg, for a new charter for the Pennsylvania Steel Company, and when this shall be secured and other matters pertaining to the reorganization arranged, the concern will be taken out of the receivers' hands. It is believed that the receivers will be discharged in about 60 days. The stockholders of the old company have subscribed $1,500,000 in cash for preferred stock in the new company, and creditors with claims aggregating $5,300 000 will be paid at the rate of 40 per cent. in cash and the balance in consolidated bonds of the Pennsylvania Steel Company and the Maryland Steel Company.

NEW INCORPORATIONS.

PEORIA, ILL.—The City & Prospect Heights Street Railway Company has been incorporated with a capital stock of $150,000 The promoters are Wm. S. Turner and Chas. Edwards, Woodbridge, and Jno. C. White.

TOPEKA, KAN.—The Topeka Electric Railway Company has been incorporated with a capital stock of $75,000, to construct a railway from Topeka to Rossville. The promoters are A. J. Arnold, T. M. James, Louis Stair and Francis C. Downey, Topeka, Kan.

CHICAGO, ILL.—The La Salle Construction Company has been incorporated. The capital stock is $100,000. The company will construct railways or tramways to be operated by steam, electricity or other motive power and do a general constructing business. The promoters are W. E. McClurg, C. H. Bumstead and F. S. Donnell.

SHELBY, O.—The Shelby Electric Railway Company has been incorporated with a capital stock of $10,000. The company proposes to construct and operate a line of railway by electric, steam or other motive power in and between Shelby, Annapolis and Olivesburg, in Richland and Crawford counties, O. The promoters are S. S. Bloom, Albert Moore and C. S. Holbrook.

TIFFIN, O.—The Interurban Rapid Transit Company has been incorporated. The capital stock is $250,000 The company proposes to construct, acquire and operate, etc., a street railway or railways in and between the cities of Tiffin and Fostoria, O., electric, steam, cable, horse or other motive power to be used in operation. The promoters are Meshech Frost, Amandus Betts, Norman McCarty, Lewis Selle and W. F. Noble.

CAPE ELIZABETH, ME.—The Cape Elizabeth Street Railway Company has been incorporated with a capital stock of $90,000. The company proposes to construct 22 miles of electric railway in Cape Elizabeth, South Portland and in the County of Cumberland. Those interested in the company are Jacob S. Winslow, Henry R. MacLeod and James H. Boyd, Portland; Albert D. Boyd, South Portland, and Thomas S. Krntz, New York.

NEWS OF THE WEEK.

NEW YORK, N. Y.—It is stated that the conduit railway on Lenox avenue will be opened June 1.

ROME, N. Y.—Work has been commenced on six compressed air motors at the Rome Locomotive Works.

ONEIDA, N. Y.—An electric railway to the lake is projected. Mr. Gano, of Springfield, is interested in the project.

LONDON, ONT.—The London Street Railway Company will begin at once the construction of a line to Spring Bank.

CHICAGO, ILL.—The traffic on the Metropolitan West Side Elevated Railway on May 6, the opening day, was about 15,000.

NEW ORLEANS, LA.—The City Council has adopted an ordinance requiring the street railway companies to sprinkle their tracks.

HARTFORD, CONN.—The last horse car in Hartford was run into the barn on May 13, and all the lines in the city are now electrically equipped.

OTTAWA, ONT.—Ahearn & Soper have been awarded the contract for the construction of the Oshawa Electric Railway. Work is to begin at once.

BROOKFIELD, MASS.—At a special town meeting held last week it was voted unanimously to grant a franchise to the Warren & Spencer Electric Railway Company.

WORCESTER, MASS.—Residents of South Worcester have sent in a petition to the Consolidated Street Railway Company asking for the extension of the South Worcester line.

HAMILTON, ONT.—During the first six months of its operation the Hamilton, Grimsby & Beamsville Electric Railway Company carried 69,851 passengers and a large amount of freight.

ITHACA, N. Y.—An electric railway to Slaterville Springs has been projected. It is announced that business men in Ithaca and Slaterville are willing to take stock in the enterprise.

PORTLAND, ME.—The Portland Railway Company has awarded the contract for its new power house on Green street, to N. E. Redlon & Son. The building will be constructed of granite and brick.

READING, PA.—The Neversink Electric Railway Company is to construct a large pavilion on the Neversink Mountain near the Highland House as one of the attractions of the resort at that point.

ST. LOUIS, MO.—The Clayton & Delmar Electric Railway Company, which was granted a franchise for the construction of an electric railway last month, has already commenced work on its road.

PHILADELPHIA, PA.—One of the officers of the Philadelphia Traction Company is quoted as saying that the fenders on the 12th and 16th street cars have picked up successfully five persons.

SENECA FALLS, N. Y.—The contract for the construction of the electric railway to Cayuga Lake has been awarded to George D. Grannis of Syracuse. The road is to be built by the 15th of next month.

AUBURN, N. Y.—The commissioners appointed by the General Term to consider the arguments for and against the construction of the proposed street railway in Genesee street held their first session last week.

DES MOINES, IA.—The Des Moines Street Railway Company will soon commence the construction of several extensions which were contemplated two years ago, but were postponed on account of the hard times.

SAN JOSE, CAL.—Rights of way have been secured for an electric railway from San Jose to Albiso. The road is to be constructed on private property, as the effort to obtain right of way on the county road was unsuccessful.

BOSTON, MASS.—A hearing took place before the railway commission in Boston last week on the protest of the Globe Street Railway Company against granting the Fall River Street Railway Company a certificate of incorporation.

CAMDEN, N. J.—At the annual meeting of the Camden, Gloucester & Woodbury Electric Railway Company it was decided to construct a telephone line extending the entire length of the road and to purchase 10 new open motor cars.

CHICAGO, ILL.—The Council passed an ordinance directing the corporation counsel to institute the necessary proceedings to compel the North Chicago Street Railway Company to extend its cable tracks on North Clark street to Diversey avenue.

NEW YORK, N. Y.—Judge Ingraham heard arguments this week on the motion to make permanent injunctions restraining the Metropolitan Street Railway Company from connecting its Lexington avenue branch with its line on Broadway, at 23d street.

NORTH ADAMS, MASS.—The selectmen have granted a franchise to the Hoosac Valley Street Railway Company to extend its road to the Williamsville line. The selectmen in Williamsville have also granted a franchise, and the road is now to be constructed.

WAUKESHA, WIS.—The directors of the Waukesha Beach Railway Company have taken action to secure a continuation of the electric railway so as to connect with the system of Milwaukee. The company is also considering an extension of the road to Oconomowoc.

CHICAGO, ILL.—An ordinance has been introduced in the City Council providing that electric cars within the city limits shall not operate at a speed greater than 10 miles per hour. The penalty for violation is a fine of not less than $100, or more than $200.

BALTIMORE, MD.—David E. Evans & Co., contractors for the Edmondson Avenue, Catonsville & Ellicott City Electric Railway, have commenced the construction of the power house in Catonsville. Four hundred men are now at work completing the grading for the road bed.

NEW YORK, N. Y.—An order has been granted requiring the Metropolitan Street Railway Company to show cause why an injunction should not issue restraining it from operating a cable railway in front of the premises at 717 Lexington avenue, owned by Mayer Feuchtwanger.

MONROE, LA.—Application has been made to the City Council for a franchise to construct an electric railway five miles in length. Those interested in the project are business men of Monroe. If the road is constructed it is probable that it will carry freight as well as passengers.

PHILADELPHIA, PA.—The Council's sub-committee on street railways has reported very favorably the ordinance granting the Philadelphia West Side Passenger Railway Company privileges for the construction of double tracks on 34th street from Lancaster avenue to Walnut street.

CHICAGO, ILL.—An ordinance has been introduced in the City Council giving a franchise to the Chicago & Worth Street Railway Company to operate a street railway by cable, electricity, compressed air, or gas motor for a period of thirty years. This is the company in which Mrs. Hetty Green is interested.

PITTSBURGH, PA.—Jane McMunn has sued the Pittsburgh, Crafton & Mansfield Street Railway Company for $10,000 damages. The plaintiff owns a large frame house in Chartiers township, and alleges that her property has been injured by the construction of the street railway along the township road.

SYRACUSE, N. Y.—Applications for street railway franchises have been made by the Syracuse Street Railway Company, the East Side Railway Company and a number of Twelfth Ward property owners, among whom are Nathan Graves, Alfred Wilkinson, N. E. Loomis, J. P. Dunlap, Alfred Mercer and C. A. Dennison.

NEWARK, N. J.—Two motormen have been held to await the action of the grand jury on the charge of manslaughter. Their cars ran over children and it is charged that the accidents were due to carelessness. It is urged in favor of the men, however, that they are both motormen of experience and have never had accidents before.

ALBANY, N. Y.—It is stated that Assemblyman Friday has shelved his bill prohibiting corporations organized in other states from controlling transportation companies in New York. It is said that this was done at the request of ex-Governor Flower, who feared that the bill might interfere with the reorganization of the Long Island Traction Company.

ST. LOUIS, MO.—Ground has been broken for the new office building of the Lindell Railway Company, at Park and Vandeventer avenues, and the officers of the company expect that they will occupy it by the 1st of July. The building will be two stories high, fire-proof, and is to cost $15,000. In time the sheds and shops at Jefferson and Chouteau avenues will be abandoned.

PHILADELPHIA, PA.—Plain iron trolley poles are being erected along the track around the City Hall by the Philadelphia Traction Company. It was announced some time ago that ornamental poles were to be used, but the architect of the building made an investigation and expressed the opinion that ornamental poles would be too prominent and therefore objectionable.

ELYRIA, O.—Tom L. Johnson is quoted as stating that an electric railway is to be constructed from Cleveland to Lorain, where the steel plant of the Johnson Company is located. Mr. Johnson is quoted as stating that the speed to be attained on the road will be the greatest of that on any electric railway ever constructed. It is stated that the distance of 25 miles will be covered in 35 minutes.

BALTIMORE, MD.—The Pikesville, Reisterstown & Emory Grove Electric Railway, an important part of the Baltimore traction system, has been opened to the public. It is almost an air line between Baltimore and Emory Grove, and is a link in the chain of railways to be built between Baltimore and the Gettysburg battlefield It passes through a number of thriving towns and villages and the expectation is it will attract very large traffic.

BOSTON, MASS—The Newton City Council has granted a franchise to the Commonwealth Avenue Street Railway Company to construct a double track electric railway on Commonwealth avenue, from the Boston line to Washington street, West Newton. The company is to keep the reserved grass space in order and run cars to the satisfaction of the aldermen. An ordinance was also adopted regulating the speed of electric cars, so that cars will travel at a speed not greater than eight miles an hour on the Boulevard.

NEW YORK, N. Y.—The following railroads filed with the Secretary of State to-day certificates of extensions of their routes in New York City· Central Park, North and East River Railroad: Beginning at Perry and West streets, easterly on Perry to Hudson street, and also at Charles and West streets, easterly on Charles to Hudson street; the tracks on Perry and Charles streets to connect at Hudson street with a branch of the Broadway an Seventh Avenue Railway. Broadway and Seventh Avenue Railway: Beginning at Greenwich avenue and Perry street, westerly on Perry to Hudson street; also from Greenwich avenue and Charles street westerly on Charles to Hudson street, the tracks on Perry and Charles streets to connect at Hudson street with a branch of the Central Park, North & East River Railway.

PERSONAL.

MR. B. J. ARNOLD, of Chicago, was in New York City this week.

MR ARTHUR CRANDALL, o Arthur Crandall & Co , of Chicago, was a New York visitor this week.

MR. PHILIP F. BEGLEY, who was formerly connected with the Lowell & Suburban Street Railway Company, has been appointed manager of the Hot Springs Electric Railway.

MR BEN WILLARD, formerly electrical engineer of the New Orleans Traction Company, has lately been appointed general superintendent of that company. Mr. W. Nelson Smith, who has been Mr. Willard's assistant for the last year, will complete the electrical reconstruction of the lines which have not yet been equipped for electric traction. This work will probably occupy most of the summer.

TRADE NOTES.

THE PHOSPHOR BRONZE SMELTING COMPANY, of Philadelphia, has just issued a little pamphlet in which the merits of its "Elephant Brand" phosphor-bronze are discussed.

THE BERLIN IRON BRIDGE COMPANY, of East Berlin, Conn , has just completed a large number of connecting bridges between the buildings of the Barbour Flax Spinning Company, Paterson, N. J. The additions to the plant of the Westminster Paper Company, Bellows Falls, Vt., are now completed. The new machine room is 40 feet wide and 185 feet in length, covered with one of the Berlin Iron Bridge Company's patent anti-condensation corrugated steel roofs.

HUNT INDUSTRIAL RAILWAYS.—The introduction of narrow gauge railways in and about industrial establishments and wherever material is required to be handled and moved short distances, is strongly recommended for economy and convenience, and their use is becoming daily more general. The C. W Hunt Company, 45 Broadway, New York City, which furnish improved machinery of this class, has recently equipped the Schoen Manufacturing Company, of Pittsburgh, Pa., with a complete system of track and cars.

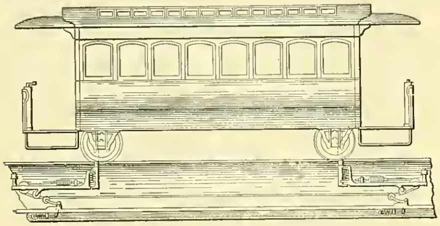
THE WHITE-CROSBY COMPANY, of Baltimore New York and Chicago, has on hand a number of large contracts for railway work. It has a contract for the Buffalo & Niagara Falls Electric Railway, which includes the entire construction and the furnishing of motors and cars. This road will have 30 miles of track, to be laid throughout with 73-pound girder rail, in 60-foot lengths, and will have stone ballast. The line connects at either end with the electric roads of Buffalo and Niagara Falls, and between the city limits of these points is expected to make 30 or 35 miles an hour. The company has a contract for 16 miles of T-rail construction for the Atlantic Highlands, Red Bank & Long Branch road, which includes motors, cars and buildings. This road is to be first-class in every respect, and will cater particularly for the summer business, connecting with the boats from Atlantic Highlands and Red Bank for all of the summer resorts between these points and Long Branch. The same company is finishing up at Baltimore several contracts for the Baltimore Traction Company, including the changing over of one of its cable lines to an electric line, shifting some of their cable track and stringing a large amount of additional feeder wire. It is also completing a contract for the City & Suburban Road at Baltimore, for the erection of 70 miles of 0000 feeder wire and about 15 miles of 500,000 circular mils cable. It has now in hand contracts amounting to about $100,000, with the Baltimore City Passenger Railway Company, which includes an extension of two miles, stringing additional feeder wires from the power house to operate the extension, and giving the increased feeder capacity for several other lines. The work of shifting cable track on Fayette street for the Baltimore Traction Company is a very difficult and interesting piece of engineering work.

Record of Street Railway Patents.

UNITED STATES PATENTS ISSUED MAY 7, 1895.

538,649. CLOSED CONDUIT ELECTRIC RAILWAY; George E Baird, Chicago, Ill., assignor of one-half to William D. Henkee and Andrew Reiner, Blue Island, Ill. Filed April 30, 1894. Arms in electrical connection with the motor are dependent from the car and extensions hinged to the arms support rollers about which the contact wire extends about the rollers. The wire is fastened to the extensions and is adapted to actuate contact devices successively as the car moves along the track, thus establishing electrical connection between the main wire and the motor. (See Illustration.)

538,650. CLOSED CONDUIT ELECTRIC RAILWAY; George E. Baird, Chicago, Ill., assignor of one-half to William D. Henkee and Andrew Reiner, Blue Island, Ill. Filed June 11, 1894. An arm dependent from the car supports parallel contact bars; conducting wires are located within the pipe sections and chambers in the conduit and are insulated except at points of exposure within the chambers; contact brushes are attached to the wires and oscillating levers which are provided with contact blocks are adapted to be brought into contact with the brushes; there is an extension of the lever which is adapted to be brought into contact with the contact bar as the car moves along the track so that the wires may be brought into electrical connection with the motor.



No. 538,649.—Closed Conduit Railway.

538,721. CAR FENDER; Henry A. Benson, Oakland, Cal. Filed Jan. 24 1895. The apron of the fender is pivoted at its upper edge, the shaft being mounted in the rear and having arms each formed with a finger or trigger at the lower end; rods connect the apron and arms at points midway between the ends; a pivoted scoop with inwardly extending arms engages with the trigger so that when the apron is struck, it moves inward, releasing the trigger and permitting the scoop to descend.

538,758. PREVENTING ELECTROLYSIS OF STREET PIPES; Richard Watkins, Sacramento, Cal., assignor of one-half to John W. Guthrie, same place. Filed June 25, 1894. This method of preventing the electrolysis of buried pipes consists in connecting the track rails with the pipes by means of metallic conductors and connecting the pipes with the generator.

538,784. RAILWAY; William F. Hutchinson, New York, N. Y., assignor to the International Railway Construction Company of New Jersey. Filed Feb. 18, 1895. A driving screw is arranged parallel to the rails, and gear mechanism that is carried by the car engages with it, means being provided for throwing the mechanism out of gear at the couplings of the screw.

538,786. ELECTRIC RAILWAY. Henry R. MacLean and Gustav A. Kornetzke, Schenectady, N. Y. Filed August 3, 1894. The conduit is formed in or adjacent to the rail and contains an electric conductor; the car wheel carries a concentric metallic insulated disc, the middle portion of which has a circular opening, while a second disc of elastic material is located in the opening of the metallic disc; the latter projects beyond the edges of the wheel and the elastic disc has a tendency to maintain it in that position.

538,838. SUPPLY SYSTEM FOR ELECTRIC RAILWAYS; William Lawrence, New York, N Y., assignor to the Lawrence Electric Company, same place. Filed April 28, 1894. There is a series of junction boxes, each consisting of a rigid wall or casing and a movable portion as a diaphragm arranged to support the service conductor, which is a superimposed sectional bar; one box is located near each end of a section of the working conductor and is arranged to hold the latter in a normal position; means are arranged to engage with and move the sectional conductor toward the box.

538,857. MOTOR TRUCK; Walter S. Adams, Philadelphia, Pa., assignor to John A. Brill, same place. Filed Nov. 5, 1894. There are oscillatory cradles on the axle box frame having springs which support the bearings; the car body has a sliding motion on the bearings.

538,858. CAR TRUCK; Walter S. Adams, Philadelphia, Pa., assignor to John A. Brill, same place. Filed Feb. 16, 1895. A semi-elliptical spring is supported on the axle frame below the side bar and has its concave surface facing downward; there are spring posts guided by the side bar and means for connecting the posts with the car body.

538,859. CAR TRUCK; Walter S. Adams, Philadelphia, Pa., assignor to John A. Brill, same place. Filed Feb. 16, 1895. The bifurcated cross bar extends between the side bars and is supported upon them between the wheels; the king pin is secured to the car body and passes through both the bushings within an aperture in the cross bar, and a bearing spring is supported upon the side bars between the forked ends of the cross bar and engages rub-plates secured to the car body.

538,864. MOTOR TRUCK; John A. Brill, Philadelphia, Pa. Filed March 20, 1894. This is a combination with an axle box frame and a car body, of truck side bearings having housing extensions from the axle box frame received within the housings, springs resting on the frame for supporting the housings, and rub-plates on the car engaging the bearings.

538,865. MOTOR TRUCK; John A. Brill and Walter S. Adams, Philadelphia, Pa.; said Adams assignor to said Brill. Filed Jan. 3, 1894 The axle box frame has side bars arranged in pairs; between each pair there is a spring upon which a plate rests, a support being provided for the springs; the plate has a central circular recessed portion with lugs or webs extending in opposite directions from it; there are openings in the lugs or webs through which posts pass and bearings connect the posts in pairs.

538,867. SWITCH SYSTEM; Mary E. Clouser and Samuel F. Clouser, Brooklyn, N. Y., assignors to the New York Car Switch Company, New York, N. Y. Filed July 30, 1894. Several switches are located along the track and a switch-closing device is provided for each one; these devices are under the control of a car wheel passing along the line of a track; there is a switch-opening device for each switch, located at different distances from one of the rails of the main line; switch-operating devices are fixed to the several cars, being attached in different positions relative to the width of the car to correspond to the several switch-operating devices that are arranged at varying distances from the rail.

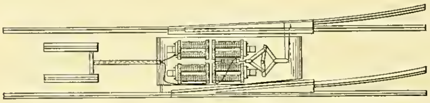
538,871. ELECTRICALLY OPERATED SWITCH; Henry A. Hartman, Philadelphia, Pa. Filed Jan. 12, 1895. The switch case contains two sets of magnets with an armature between them; there is a frame on the case which supports a rod secured to the armature; an arm is attached to the switch, and a system of toggle levers between the arm, rod and contact points is connected with the series of magnets, suitable mechanism on the car being adapted to complete the circuit. (See Illustration.)

538,873. GUARD FOR STREET CARS; Henry A. Howe, New York, N. Y., assignor to himself, Joseph Livingston and Albert H. Gross, same place. Filed Oct. 18, 1894. The guard has top, side and front bars, and brackets receive the front one; a lever pivoted upon the platform extends up far enough so that it may be operated by the leg of the driver; a rod is connected to the lower end of the lever and an arm is fastened upon the top bar of the guard, having an eye at the lower end for receiving the end of the rod; a drop bar engages the rod for connecting the operating lever with the guard for moving down the front edge; a bolt allows the arm to separate from the rod when the guard is swung up in front of the platform; springs and an arm upon the top bar of the guard sustain the weight of the guard in its normal position.

538,904. ELECTRICAL CONNECTION; James M. Faulkner, Philadelphia, Pa. Filed Feb. 28, 1895. The ends of the rails have holes in which mercury is placed and the ends of the bond terminate in the mercury.

538,936. CAR FENDER; Louis F. Trinchard, New Orleans, La., assignor of one-third to Frederick Querens, Jr, same place. Filed Jan. 2, 1895. The basket body of the car fender is supported by a frame which consists of end bars and a front bar, the former being curved at the connection with the car body and provided at the back with sockets from which there are rearward extensions.

538,940. CAR FENDER; Otto A. Wicke and Philip Reinhart, Brooklyn, N. Y. Filed Oct. 5, 1894. There are parallel brackets beneath the cars and eyes are suspended from the front end of the car; the sliding fender has turned-up braces to slide on the car tracks, while at the top there are brackets to engage with the eyes.



No. 538,871.—Electrical Operated Switch.

538,943. FENDER OR LIFE-SAVING ATTACHMENT FOR CARS; George W. Archer, Rochester, N. Y., assignor to the Archer Manufacturing Company, same place. Filed Nov. 18, 1893. The pivoted guard frame has a vertical rear portion and lower horizontal portion, each provided with cushions; the horizontal portion is provided with a roller and the frame is pivoted below the upper end of the vertical portion to the car, having its lower front edge below the pivot in the rear of which it is weighing.

538,948. MOTOR TRUCK; John A. Brill and Walter S. Adams, Philadelphia, Pa.; said Adams assignor to said Brill. Filed Feb. 17, 1893. Claim 1 reads as follows: "The combination in a car body of the pivotal truck having an axle box frame and yokes therein; large driving wheels at the forward and smaller trailing wheels at the rear end of said frame, both sets being journaled in the yokes at opposite ends of the frame, bars above the frame extending rearwardly from the upper part of the forward yokes, bearings sustained above said bars by posts passing through said bars. Springs support the posts on said frame below said bars, rub-plates on the car engaging said bearings, a transversely disposed and segmentally slotted draw-head secured to said frame forward of the driving wheel, and a vertically disposed draw bar on the car passing through said slot."

538,982. CAR FENDER; Robert Thomson, Brooklyn, N Y., assignor of one-fourth to Joseph Norwood, same place. Filed Oct. 12, 1894. The fender has a yielding cover and is provided at its rear part with rearwardly inclined supports connected at their upper ends to the car. A pivoted folding apron is adapted to be arranged on the supports in an inclined position.

Street Railway Gazette.

Vol. XII. NEW YORK, MAY 25, 1895. No. 21.

SCHENLY PARK & HIGHLANDS RAILWAY OF PITTSBURGH.

THE Schenly Park & Highlands Railway of Pittsburgh and the Homestead & Highlands Street Railway of Homestead are parts of the same transportation system and their terminals are connected by a bridge spanning the Monongahela River. The former railway, once known as the Squirrel Hill line, was originally built, as one of its owners recently remarked, as "a real estate road with but one terminus," that is, it was constructed for the purpose of developing suburban property, the line terminating at a point beyond the localities where traffic could reasonably be expected at that time. The railway passed into the hands of its present owners in 1889. The road extends from Oakland through Schenly Park to the Monongahela River with branches to East Liberty and Braddock, where the Carnegie furnace and rail mills are located. The road, with its branches, affords not only crosstown transportation of great convenience, but provides for Schenly Park facilities such as are given by no other road. The railway extends through the boulevard district now being developed by the city of Pittsburgh, paralleling the main boulevard for about three miles at a distance of from 100 to 1,000 feet and crossing it twice. The route lies through a district that is made picturesque by scenery that is unusually beautiful.

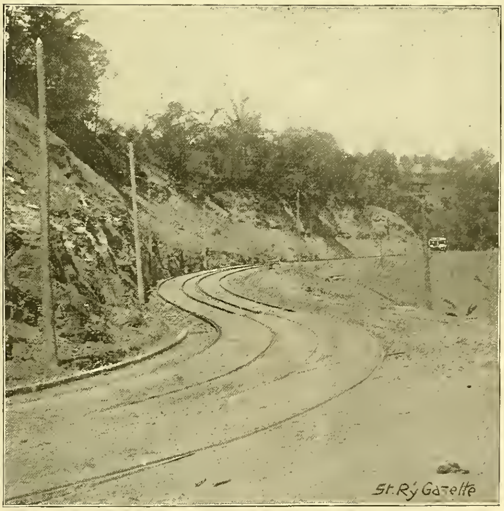


FIG. 1.—REVERSE CURVE ON BRIDGE APPROACH.

The Homestead & Highlands Street Railway, connecting several stations of the Baltimore & Ohio, the Pennsylvania and Vanderbilt railway systems, was constructed by the same gentleman who built the Schenly Park & Highlands road, associated with Messrs. Rott, Troutman and Gladden, of Homestead. The company has constructed costly terminals in Homestead, and much of its construction has been of an unusually expensive character. The greater part of the line is single-tracked, with turn-outs, and to guard against the possibility of collisions, the Ramsey electric railway signals have been installed, providing what is practically a block system for the road. The line passes the great Carnegie armor plate mills and crosses the second bend of the Monongahela, as the Schenly Park & Highlands Railway cuts off the first. It also reaches Duquesne where the steel works lately acquired by the Carnegie Company are located, and extends to McKeesport, where the National Tube Works and the Woods Planished Iron Mills are situated.

The two associated roads are now operated jointly, and are soon to be brought under the control of one corporation, the Monongahela Traction Company, for which a charter has been procured. With a total mileage of about seven or eight miles each, they accommodate a district having a population of nearly 100,000—a section in which are situated manufacturing plants with the largest pay rolls in the country. By uniting these outlying districts with the city the two roads are assisting materially in the movement for Greater Pittsburgh, which, if realized, will make that city the fourth in population in the United States.

The Homestead community, which is unusually enterprising, publicly celebrated, by a parade and other festivities, the joining of the two roads by the bridge across the Monongahela, Fig. 2. This structure was built by Capt. S. S. Brown, at a cost of $150,000. Approaches to the bridge are nearly a mile in length; 240 feet on the Homestead side and 4,700 feet on the Pittsburgh side. The bridge spans the tracks of the Baltimore & Ohio Railway at an elevation of 25 feet and those of the Second Avenue electric railway at a height of 40 feet. The construction of the approach on the Pittsburgh side was a difficult piece of engineering, Fig. 1. For half the distance the grade is 6.4 per cent. and for the remainder 6 per cent., while curves are made necessary by the topography, some of them of 125 feet radius. For nearly the entire distance very heavy cutting or filling was necessary, the excavation alone costing nearly $30,000. Braddock's old road to Fort Pitt, afterwards the famous Bedford Stage route, parallels this approach at a short distance away.

On the older portion of the road the track is laid with 40-pound T and 45-pound Johnston girder rails. In the newer construction, 50- and 60-pound T-rails and six, seven, and nine-inch girder rails were laid. The rails are spiked to oak ties, of which 11 are laid for every rail length. About two miles of the track was laid with a 52-pound girder rail. The difficulties ordinarily encountered when this rail is used seem to have been overcome in this construction by the use of bridge joints 30 inches in length. They are made of T-rail inverted and cast into iron chairs. They support the entire weight of the traffic at the joints while the fish-plates are depended upon merely for keeping the rails in line. Wooden side poles are used for supporting the trolley wires throughout the line. Two of the three steam railway companies whose tracks are crossed by the system in Homestead have already made arrangements with the management to use the line for a short cut for their pleasure traffic to Schenly Park, and are selling round trip tickets over the route.

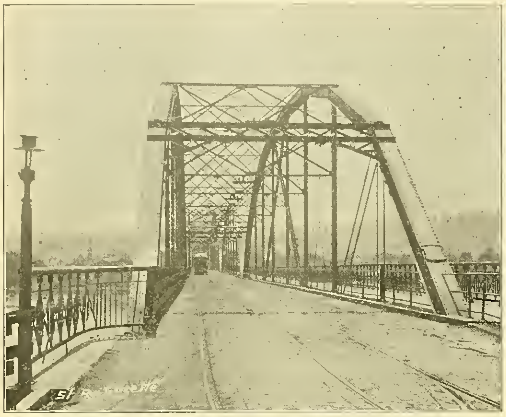


FIG. 2.—BRIDGE ACROSS THE MONONGAHELA

Several bridges have been built in addition to that over the Monongahela River, three of them being located in the park near the Carnegie library over two pretty valleys and the tracks of the junction railway of the Baltimore & Ohio Railway. The fourth bridge, shown in Fig. 4, spans the canon of Four-Mile Run about three eighths of a mile east of Schenly Park, which is shown in the background of the picture. The bridge is constructed of steel and is 350 feet long and 75 feet above the little stream which it crosses. The masonry was built by the company, stone being taken from the quarries along the line of the road. The quarries are interesting from the fact that they are operated by electric motors and electric locomotives. The latter were built at the company's shops in Oakland especially for this purpose. The superstructure of the bridge was built by the Pittsburgh Bridge Company. Provision was made for two tracks and the second is now being laid.

The power station is located near the Monongahela River, near the line of the Baltimore & Ohio Railway. The building is a substantial structure of iron and steel. The present power equipment consists of two tandem compound condensing Corliss engines of 350 horse-power each, built by the Nordberg Manufacturing Company, of Milwaukee, Wis. The cylinder dimensions of the engines are 16 and 30 inches in diameter with 40-inch stroke. Each engine is belted to a Westinghouse multipolar generator by a 42-inch belt supplied by the Charles Munson Belting Company, of Chicago. The boilers, which are shown in Fig. 3, are of the Stirling water-tube type. The condenser, which is of the Independent type, was furnished by the Nordberg Manufacturing Company, of Milwaukee, and the feed-water heaters were supplied by the same company. Hall duplex feed-water pumps and Monitor injectors are employed. Water for feed and condensing purposes is taken from the river or from a creek near the power house. Feed water may also be taken from a tank 12 x 12 feet, built especially for this purpose. Fuel is brought directly to the station on cars.

An ingenious alarm has been designed by the engineer of the power station for notifying the attendants if a circuit breaker drops. A cord is attached to the handle of the circuit breaker and runs over pulleys to the lever of a steam whistle. When the circuit breaker drops the lever of the whistle is pulled down by the cord, and the shrill noise can be heard in every part of the plant, until the circuit breaker is replaced.

The building has been so arranged that the power plant can be increased to meet the demands of the traffic. The cars of the company are handsomely painted and decorated, and were built by the Gilbert Car Manufacturing Company, of Troy, N. Y., and the Barney & Smith Car Company, of Dayton, Ohio. They are mounted on trucks built by the latter company and by the Baltimore Car Wheel Company. The cars are equipped with two 30-hp motors each, furnished by the Westinghouse Electric & Manufacturing Company, of Pittsburgh, and the Walker Manufacturing Company, of Cleveland, Ohio.

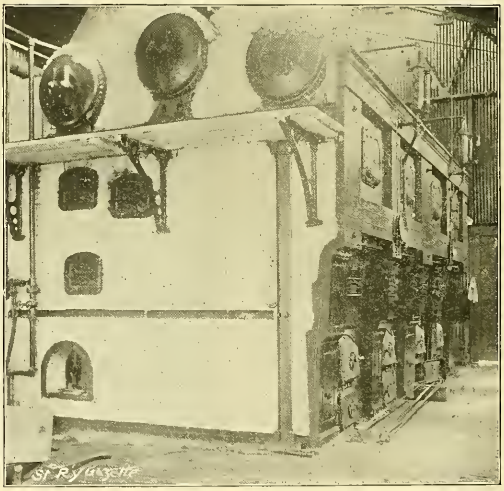


FIG. 3.—BOILER ROOM.

The gentlemen who have been instrumental in promoting the success of the enterprise are R. G. Wood, of McKeesport, president of both companies; S. J. MacFarren, vice-president and general manager; Thomas A. Noble, treasurer; Louis Rott, of Homestead; F. G. Kay, of Pittsburgh, and E. M. Fulton, of Pittsburgh. The entire line was constructed under the supervision of Mr. MacFarren, who is responsible for all the details in design, construction and operation.

The system is one which naturally attracts the patronage of those who ride for pleasure only. Latterly, arrangements have been made by which school children are enabled to enjoy excursions over the lines. A subscription list was circulated among the business men of Homestead by the chief of police with the result that means were provided for giving the pupils in the Homestead public schools an excursion. Private cars for each class, about 30 in all, conveyed the children to Schenly Park, with its zoölogical garden and flower show. This precedent was followed in Munhall, near Homestead, where the armor plate mills are located, and the children of both the public and parochial schools enjoyed an outing. The plan is one that is likely to spread throughout the Monongahela Valley.

Consolidation in Kansas City.

A dispatch from Kansas City, Mo., announces that the consolidation of all the important street railways in Kansas City was completed on May 20, when, by a vote of 80 per cent. of all the stock, the Metropolitan Street Railway Company ratified the agreement to consolidate. The scheme of consolidation is for the Metropolitan to increase its capital stock from $3,600,000 to $8,500,000, and acquire the stock of the Grand Avenue Railway, the Kansas City Cable Railway, and the Kansas City & Independence Rapid Transit. An action will probably be brought by John Turnbull, of Chicago, a stockholder in the Metropolitan Company, to enjoin the consolidation.

Proposed Consolidation in Pittsburgh.

It is announced that the consolidation of the street railways of Pittsburgh, concerning which a report was published in the last issue of the Street Railway Gazette, has been practically effected. President Magee, of the Duquesne Traction Company, of Pittsburgh, and Messrs. Widener, Elkins and Dolan, of the Philadelphia Traction Company, who have large interests in Pittsburgh, are credited with engineering the deal. So far the details of the conference of these gentlemen, in Philadelphia, have not been made public.

The original idea was to consolidate the Pittsburgh and Duquesne traction companies, which have already been brought as closely together as has been possible outside of actual consolidation. Now it is said that the deal, if it goes through, will embrace nearly all, if not all, the 13 companies controlling the passenger railway lines in that city. These 13 companies operate 242 miles of road, as follows: Citizens', 30 miles; Pittsburgh, 12; Duquesne, 28; Pittsburgh, Allegheny & Manchester, 20; Federal Street & Pleasant Valley, 28; Pittsburgh & Birmingham, 17; Central, 9; the Pittsburgh & West End, 16, and the Second Avenue, 55 miles; about 27 miles of track are operated by the cable system, 195 miles by electricity, 13 miles by horses, and seven miles by steam.

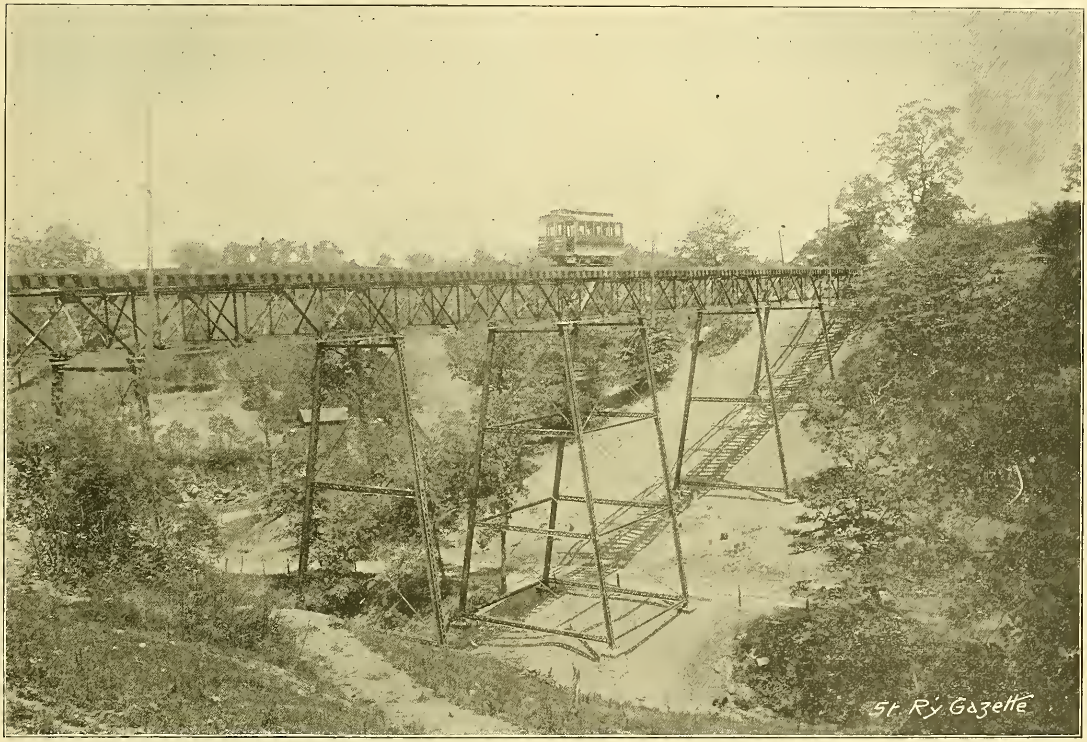


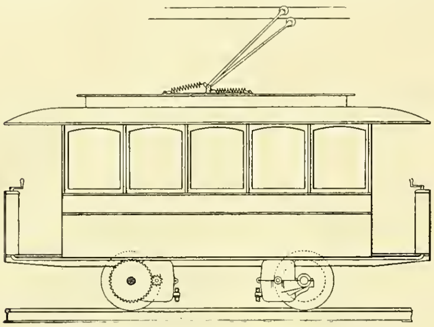
FIG. 4.—STEEL BRIDGE OVER FOUR MILE RUN.

Cars for the Nantasket Beach Electric Line.

Three of the new combination baggage and motor cars for the Nantasket Beach electric line of the New Haven & Hartford Railway are ready for service. The forward or motor end of the cars has an iron frame pilot, somewhat similar to that on a locomotive, although of lighter construction. The front platform is enclosed on the front and left side with heavy sheet iron, painted a drab, while on the right side there is an iron lattice work gate above the steps. It is thought that an electric brake will be used on the cars, which has been tried with entire success on a number of street car lines.

Alternating Current Railway System.

A patent has just been granted to Albert H. Strong, of Schenectady, N. Y., for a three-phase alternating street railway system. The two three-phase motors with which a car is to be equipped are mounted in the usual way and current is supplied from two overhead trolley wires and the track, two trolley poles being used. The patent relates particularly to the regulation of the motors, which consists broadly in connecting the motors first in straight series and finally in multiple, as in the familiar controller method now in vogue in direct current systems. The regulation in detail is as follows: In the first active position of the controller the two trolley wires and the track are connected with the three field coils of one motor, the secondary coils of the two motors being interconnected, while the primary coils of the second motor are connected through resistances. When the controller is moved to the second position a part of these resistances is shunted, but the circuit connections are otherwise unchanged. In the third position of the controller the shunt resistances are entirely removed, the remainder of the connections still being unchanged. The next position is preparatory to throwing the motors in multiple, the resistances being connected across the leads which pin the secondary windings of the motors. At the fifth position the motor whose field coil terminals were formerly connected with each other is thrown out of circuit and at the sixth point the fields of the two motors are thrown into multiple, those of the first motor maintaining their original connection with the two trolley wires and the ground, and the secondary windings of both motors being interconnected and shunted by resistance coils. The movement of the controller to the final position merely removes this shunt.

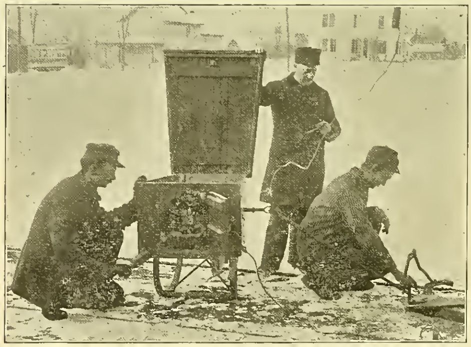

CAR EQUIPPED WITH THREE-PHASE MOTORS

Inspecting Tracks.

The St. Louis *Globe-Democrat* quotes the manager of a local street railway as follows: "As a detector of weak spots in a track a good heavy rain cannot be excelled. After a downpour I usually go over the road and then all the great and minor defects of the roadway are plainly seen by the practiced eye. The rails and roadbed are actually washed clean, the water having carried away all the dust and loose dirt, leaving the macadam, granite or other paving exposed. Even if the tracks are in good condition it is wise if the precaution is taken to prevent threatened damages. Much money can be thus saved to the company in the long run. The sending out of the foreman and a few section hands to tinker a little here and there, which tinkering is not absolutely necessary, can be called a preventive, and I find it by experience to be a good investment. The old saw of a stitch in time saves nine is well worth following in the street railway business. Low joints, broken bonds, flattened end of rails and the like can be easily avoided. Employment of more section hands possibly swells the maintenance account a little, but I tell you, on the other hand, there is no great raid made on the supply store for new material. My experience teaches me that a thorough system of inspection, with promptness in repairing trivial breaks, is the only sure remedy against a large scrap pile. The larger the scrap pile the smaller the dividends. Be careful of little troubles and there will be no great ones to bother you, that is, as far as wear and tear of track and machinery are concerned."

A Wheelbarrow Drill.

The portable electric drill shown at work in the accompanying illustration was designed in the shops of the Glens Falls, Sandy Hill & Fort Edward Street Railway Company, of Glens Falls, N. Y. While a somewhat homely combination so far as appearances go, it has answered admirably the purpose for which it was constructed. It is used by the construction department in drilling holes for bonds in the webs of rails. The electric motor which furnishes the power has a capacity of one-half horse power and is mounted, as the illustration shows, on a platform wheelbarrow. Current is secured from the overhead trolley wire and ground connection is made to the rail. The armature is connected with an intermediate shafting to reduce the speed. From the latter a flexible shafting extends which is connected with the drill. The feed is regulated by a thumbscrew located just back of the drill. It is stated that by the use of this device a hole can be bored in the rail in less than a minute. The drill is also used in the shops of the company whenever it is needed. With the exception of the motor all the parts of the combination were constructed in the shops of the company. For the information presented herewith we are indebted to William Finegan, superintendent of the company.


DRILLING RAILS FOR BONDS.

Milwaukee Street Railway in Receivers' Hands.

Henry C. Payne, of Milwaukee, and George R. Sheldon, of New York, have been appointed receivers of the Milwaukee Street Railway Company, of Milwaukee, Wis. The appointments were made in Milwaukee last Monday. The receivership has been impending for some little time. Last week it was announced that over nine tenths of the bondholders had assented to an agreement to place the property in the hands of a receiver preparatory to foreclosure and reorganization, as the company was in default three coupons and another fell due June 1.

HENRY C. PAYNE.

Henry C. Payne, the vice-president and financial head of the company, came east a few weeks ago to confer with the bondholders in reference to passing again the interest on the bonds. It is understood that he was unsuccessful in securing an agreement to that effect.

The electric light and electric railway properties of Milwaukee are now affiliated, and are owned, in the main, by eastern capitalists who have been associated with Henry Villard.

Outstanding against all the property—the electric railways and the illuminating plants—are bonds to the amount of $11,250,000. The first issue of 30-year bonds, in 1890, was $10,000,000, and after the purchase of the west side lines additional bonds to the amount of $1,250,000 were issued. A majority of these bonds have passed into the hands of the North American Company and its friends. The bonds bear interest at the rate of 5 per cent., and the total yearly interest is $561,500. The pay roll, taxes, insurance and other expenses amount to $740,000 a year, making a total, with the yearly interest on the bonds, of $1,391,500. To meet these expenses a daily income from street car fares and electric lighting accounts of $1,600 a day is necessary, which has not been forthcoming.

There are two Milwaukee street railway companies. One is the Milwaukee Street Railway Company, of New Jersey, and the other is the Milwaukee Street Railway Company, of Wisconsin. The former was chartered by New Jersey, and its authorized capital is $5,000,000. William Nelson Cromwell, of New York, is president. The Milwaukee Street Railway Company, of Wisconsin, is capitalized at $1,000,000.

The North American Company owns the Milwaukee Street Railway Company of New Jersey, the Milwaukee Street Railway Company of New Jersey owns the Milwaukee Street Railway Company of Wisconsin, and the Milwaukee Street Railway Company of Wisconsin owns the old Cream City, Milwaukee City and West Side railway systems and in addition it controls the Edison and Badger illuminating companies, the Milwaukee Electric Railway Company or Hinsey line and the Milwaukee & Whitefish Bay Railway Company.

According to Henry C. Payne, the following amounts were paid for the various street lines: Milwaukee City, or McGeoch lines, $3,100,000; Becker lines, $1,480,000; Cream City, $1,080,000; Hinsey lines, $345,000; Whitefish Bay line, $90,000; total, $6,095,000. About $380,000 was paid by the syndicate for the plant of the Badger Illuminating Company, and about $200,000 paid for the work done up to 1890 on equipping the Edison electric light plant, making, it is claimed, a total investment of $6,675,000.

The entire street railway system in Milwaukee, now owned by the Milwaukee Street Railway Company, comprises 135 miles of track, over which 250 cars are operated. The officers of the company are: President, W. N. Cromwell; vice-president, Henry C. Payne; secretary, C. A. Spofford; treasurer, A. Marcus; general manager, C. D. Wyman.

Long Island Traction Company.

During the last month President Vreeland, Treasurer Ryan and Chief Engineer Pearson, of the Metropolitan Traction Company, of New York City, have been investigating the condition of the Brooklyn Heights Railway on behalf of the Long Island Traction Company, which leases that railway, and which is now in the hands of a receiver. The reorganization of the Long Island Company has been undertaken by a committee at whose solicitation the inspection was made. The reports have not been made public, but the principal findings have reached the stockholders. It is stated that three reports drawn up independently unite in finding that the track which has been laid by the present company is in a bad condition and that it must be taken up, with the exception of a few sections where better track has been put down. This means that on about two hundred miles of single track new rails must be substituted. The cars were found to be in a bad condition from the effect of operation on a poor track and a rough roadbed. The overhead work is said to be in a fairly satisfactory shape and will not need much repairing. The cost of these repairs will aggregate between $3,000,000 and $4,000,000. The power houses were found to be in good condition and may be operated, according to the experts, at from 15 to 20 per cent. less than the present cost. The operation of the cars was criticised, and it is stated that 20 per cent. too many cars were in service considering the amount of travel. It was also said that too many full trip cars and not enough trippers were operated.

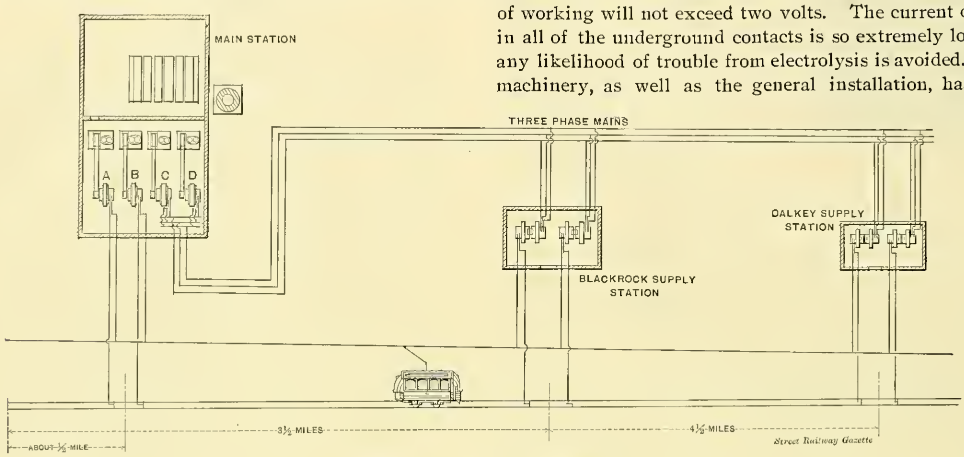
The reorganization of the Long Island Traction Company depends, to a great extent, on the ability of the Brooklyn Heights system to earn more than the rental. The prospect is not favorable just at present as the earnings are falling off as a result of the fact that cars must travel at a slow rate of speed to conform to the new city ordinance. The latest rumor in connection with the Long Island Traction interests is that ex-Governor Flower is to be president of the reorganized company.

Boston Rapid Transit Subway.

The hearing of an application for an injunction to restrain the Subway Commissioners from proceeding with the work of construction of the subway has been postponed by Judge Holmes until June 4. The case will then be heard by Judge Knowlton. The counsel for the petitioners have asked for an early hearing, inasmuch as the city treasurer is likely, at any time, to issue bonds on account of the construction, and make payments for the work.

Three-Phase Street Railway Plant.

Mention was made in the May 11 issue of the Street Railway Gazette that the Dalkey line of the Dublin Southern Company was to be electrically equipped. The installation will possess several interesting features. In the power plant there will be installed three-phase and continuous current apparatus. It was deemed advisable to install a combined system from the following considerations: First, the great length of the line; second, the rule of the Board of Trade that the drop in the earth return may not exceed seven volts; third, the suitability of the different sites available, the one at the company's large depot, Balls Bridge, being particularly suitable in that there is a natural and adequate supply of condensing and feed water, and that the present buildings are suitable for offices, shops, and so forth, while certain further local conditions had also to be met. By referring to the accompanying diagram it will be seen that the Balls Bridge station is about half a mile from the city end of the lines. In case the whole current had been brought over the rails for return, the drop would have amounted to about 20 volts; the cross-section of each of the four rails being seven and one-half square inches, it became evident that if the road was to be operated from Balls Bridge several points of distribution were necessary. The tramway company possesses suitable buildings for sub-stations at Blackrock and Dalkey; it was, therefore, decided thatthe most satisfactory way of meeting the conditions was to operate the portions of the road sufficiently accessible to the main station from ordinary railway generators, and to transmit the power to sub-stations at Blackrock and Dalkey by means of three-phase current generated in the main station. In the diagram are shown two generators (*A* and *B*) supplying current direct to the trolley system. These machines are of 100 kilowatts capacity each. Machines *C* and *D* are three-phase machines generating current at from 2,500 to 3,000 volts at a periodicity of 30 complete cycles per second; these machines are of 120 kilowatts each. At the sub-stations are two synchronous motors, each of 60 kilowatts capacity, driving by means of an insulated coupling a 500-volt commutating machine. The nominal output of each of these sub-stations is 120 kilowatts, which is considerably in excess of all ordinary requirements. The commutating machines in the central station furnish exciting power for the three-phase generators. The synchronous motors in the sub-stations may be started either from the three-phase mains or by the commutating machines, suitable means being provided. In the sub-stations are automatic circuit breakers, such as are commonly used in the practice of the General Electric Company. Duplicate triple concentric cables are laid between Balls Bridge and Blackrock, so that in any emergency there will be no failure of service. Allowing one and one-half Board of Trade units per motor car with trailer per car mile, the percentage drop in the three-phase main, plus that in the trolley main, will be less than 8 per cent. With the same weight of copper at 500 volts, the drop would amount to 30 per cent. The maximum drop in the earth return under normal conditions of working will not exceed two volts. The current density in all of the underground contacts is so extremely low that any likelihood of trouble from electrolysis is avoided. The machinery, as well as the general installation, has been designed by Mr. H. F. Parshall, of British Thomson-Houston, Limited. The electrical engineer acting for the Dublin Southern Company's system of electric tramways is J. Clifton Robinson, who has charge of the work. The accompanying diagram is reproduced from *Engineering*, London.



GENERAL PLAN OF SYSTEM.

Trolley Mail Service.

It is probable that the electric lines of New Orleans will be utilized for the distribution of local mail. Second Assistant Postmaster-General Neilson was in that city last week to make a preliminary investigation, at the conclusion of which he stated that the system would undoubtedly be introduced.

The Senate of the Pennsylvania Legislature has agreed to the conference report on the House bill conferring on street railways the right to carry and distribute the United States mails.

Chicago & St. Louis Electric Railway.

But little has been heard for the last year and a half of the Chicago & St. Louis Electric Railway, of which Washington Adams is the projector. He is quoted as saying that for the last few months the officers of the company have been busily engaged in endeavoring to find a market for the bonds which the company needs to sell before beginning the construction of the road. According to Mr. Adams, arrangements have been made with Chicago bankers for placing $9,000,000 of the $10,000,000 worth of bonds to be issued.

Street Railway Engineers.—V.

A. LANGSTAFF JOHNSTON.

Mr. A. Langstaff Johnston has been a prominent street railway engineer ever since the practicability of applying electricity as a motive power was conclusively demonstrated by the successful operation of the Richmond & Union Passenger Railway in 1887. Before that time the street railway field presented few opportunities for the exercise of the engineer's skill. When the Richmond installation was undertaken by Mr. Frank J. Sprague, engineering skill and ingenuity of a high order were urgently demanded. An entirely new set of conditions was encountered in the equipment of this first commercially successful electric railway and no precedents could be followed in solving the various problems. The work of drawing up the plans of the difficult track work, etc., was entrusted to Mr. Johnston, and his reputation as a successful street railway engineer has dated from the successful completion of that pioneer railway installation. Since that time he has been continuously engaged in the street railway field and is now chief engineer of the Hestonville, Mantua & Fairmount Passenger Railway Company, of Philadelphia, Pa.

Mr. Johnston was born in Richmond in 1850, and was graduated from the Virginia Military Institute. Among the well-known instructors in that institution under whom he studied were Capt. J. M. Brooke, famous for making the survey for the first Atlantic cable, and for a variety of scientific inventions, and the late Matthew Maury, whose scientific writings are known the world over. After his graduation Mr. Johnston was employed with the contractors in the construction of the Chesapeake & Ohio Railway and he was assigned to important tunnel work and acquitted himself with credit. Subsequently he was appointed assistant city engineer of Richmond and assisted materially in the development of the present water-works system of that city.

A LANGSTAFF JOHNSTON.

In 1876 he was made city engineer of Manchester, Va., where he designed and established a system of street grades and introduced other extensive improvements. From 1877 to 1880 he was engaged as assistant engineer on river and harbor improvements with Col. William P. Craighill, now chief of engineers U. S. A. Subsequently he engaged in a variety of railway enterprises in Virginia, the most noted of which was the Richmond & Allegheny Railway. In 1887, as has already been remarked, he engaged in the construction of the first electric railway in Richmond. In 1889 he constructed the Richmond & Seven Pines Electric Railway, extending to the battlefields about Richmond. In 1890 he built the Richmond & South Side Electric Railway and laid out, in connection with the railway, the addition to the Woodland Heights and Forest Hill Park.

He has since that time constructed the New Orleans & Carrollton Railway, 20 miles in length, the first electrically operated road in New Orleans. After the completion of the work he accepted the position which he now holds with the Hestonville, Mantua & Fairmount Passenger Railway Company, one of the oldest horse car lines in Philadelphia. The electrical equipment of the system was begun in 1893 in conformity to the plans of Mr. Johnston, which embodied many features of mechanical and electric interest. The main lines are now in operation and several extensions are contemplated. He is now engaged in the construction of the Fairmount Park & Haddington Street Railway, which is to form part of the same system. Mr. Johnston has won distinction by the invention of a number of ingenious devices which are now well known in street railway practice. Notable among these is the Johnston rail bond in extensive use in electric railway construction, and the device by which a live electric wire is rendered absolutely harmless if broken on the circuit. The latter device is in use on the Hestonville, Mantua & Fairmount Passenger Railway, and will also be employed in the construction of the Norfolk & Ocean View Railway, for which Mr. Johnston is consulting engineer. Mr. Johnston is a member of the American Institute of Electrical Engineers, a member of the American Society of Civil Engineers, and a member of the Franklin Institute.

Two Street Railway Collisions.

Two collisions on street railways have occurred within the last few days involving unusually serious consequences to passengers. The more serious accident was that at Bensonhurst on Sunday last on the line of the Brooklyn Heights Railway. Seven persons were injured, four of them seriously. The collision resulted from violations of the company's rules and one of the city ordinances. According to the company's regulations cars must not approach each other nearer than 100 yards. The ordinance of the city council, recently passed, provides that cars must stop at the near crossing. The motorman of one car, in violation of the latter regulation, stopped his car at the far crossing. The motorman of the car which was following at a distance of about two car lengths was led to believe that the car in front of him was not to stop at the crossing, and he was unable to apply the brakes in time to prevent the collision.

The second collision occurred in St. Paul last week. In this case the accident was due to the failure of the brakes, as a result of which one train crashed into the one in front of it. Ten persons were injured, but only one was seriously hurt.

Regulation of Electric Railways.

At a meeting of the State Railway Commissioners, in Washington, D. C., last week, a committee of five was appointed to consider the question of the regulation of State and interstate electric railways. It seemed to be the general opinion of those present that regulations in addition to those now in force should be adopted by legislatures to govern the operation of electric railways.

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CHEAP TRACK CONSTRUCTION.

The economy which is responsible for cheap track construction when ponderous motor cars are to be operated is of the penny-wise and pound-foolish variety. A striking proof of the assertion can be found in the experience of a Brooklyn company whose railway properties have been recently investigated by a committee of experts. According to their report the track construction is so weak and unsubstantial that its abandonment is essential to the success of the system. To substitute good construction for that which is now in use will require an outlay of several million dollars. There is a wise and an unwise economy in expenditures for street railway equipment; that is always unwise which seeks to cheapen materially the cost of track construction.

FENDER TESTS.

The railway committee of the New York Board of Aldermen will have a hard summer's work before it if the inventors of fenders generally accept its invitation to make public exhibitions to demonstrate the peculiar merits of their various life-saving devices. It seems to be the general belief that a fortune awaits the person who designs a life guard for street cars that will successfully meet all the requirements, and an army of inventors is struggling for the prize. In the last two weeks no less than 15 patents have been issued to persons who believe they have solved the problem. The tests which are to be made in New York ought to be instrumental in bringing to light some type of fender which will be of greater service than any now in use. There are several fenders now in use that are performing good service, but improvements are possible.

DISCUSSIONS AT THE CONVENTION.

It seems to be the intention of the executive committee of the American Street Railway Association to make the conventions of greater practical benefit to those who attend them. With this end in view, sessions are to be arranged with a view to the discussion of the great range of practical problems which the manager is daily called on to solve. The innovation is a commendable one, for the discussions of subjects of timely interest have heretofore been few and far between. At the same time we trust these sessions will not be executive in the sense that reports of the discussions will not be available for publication. If it is understood that each speaker's audience is to be limited to those actually present the interest will be materially less than would be the case if it were recognized that the views expressed would be brought to the attention of street railway men the country over. By all means have discussions on live topics and let us all have the benefit of them. There are certainly topics in abundance that may be discussed with profit. A great many members would be glad to receive new light on the fender question, though it may seem to be rather hackneyed. The matter of the electrolysis of pipes or that of speed on city tracks might be considered to advantage. Numerous topics relating to repairs and maintenance could be selected. If the convention cared to go outside of matters connected with operation, discussion of competition with steam roads and the legislation likely to follow in consequence of it would prove of interest. If this promised plan is developed as it should be the innovation will be one of the most profitable and attractive features of the conventions.

MAKING COMPLAINTS.

In a recent interview in a New York paper, Mark Twain is quoted as saying that the moral duty of making complaints when minor public abuses are discovered is badly neglected by Americans. He referred incidentally to street railways for examples in support of his assertion, and cited one incident which occurred on an elevated railway in New York City. The passengers of a crowded car did not move rapidly enough to suit the impatient guard at one station where the train had stopped. When all had left the platform, with the exception of two men and a woman, the trainman pulled the rope and the train started. The men jumped, but the woman, who was carrying a child, could not do so, and had not the former assisted her she might have been seriously injured. Mr. Clemens states that he took the man's number and made a complaint at the office of the Manhattan Company. He was given courteous attention and his demand that the case be investigated was promptly acceded to. It was found that the guard's record was good, and at Mr. Clemens's request he was merely reprimanded. The incident, the complainant maintained, was one calculated to make the employee much more careful in the future. Mr. Clemens's conclusion is that only by such interference on the part of the public can local transportation be improved, the rights of passengers be respected, and discourtesy and misconduct of employees be properly rebuked and corrected. There is doubtless a great deal of truth in what Mr. Clemens says, for the prevention of carelessness and flagrant misconduct is not easy unless the attention of managers is called to the facts. At the same time we think most managers of street railways will incline to the belief that the public needs no urging in the matter of making complaints of abuses on their systems. In the large cities where street car travel is an incident of daily life, passengers have little hesitancy in the premises, but are much more inclined to institute complaints than is the case with travelers on steam railways which are patronized by the majority of people only occasionally. Complaints would receive much more attention and the public would be encouraged to make them more often were it not for the fact that street cars are patronized by so many crochety persons who are disposed to find fault if matters are not conducted according to their peculiar notions, regardless of what the rules of the company may be. It is, for example, no uncommon thing to hear conductors threatened with complaints in the city of Brooklyn because their cars do not stop at the far crossing, and the fault-finding passengers frequently will not even listen to the explanation that the stop at the near crossing is made in accordance with a city regulation. We are inclined to believe, however, that street railway managers lay aside, too often, just complaints which should be investigated, and that the service, in many instances, could be improved by extending a more cordial invitation to passengers to criticise matters which do not meet their approval.

To Investigate New York Street Railways.

The following committee has been appointed by Speaker Fish, of the New York Assembly, to investigate the street railways of the State with special reference to the question of the advisability of municipal ownership of such properties: Messrs. Nixon, of Chautauqua; E. C. Stewart, of Ithaca; Stevenson, of Washington; Thompson, of Dutchess; Gerst, of Erie; Foley, of New York; and Hennessey, of Brooklyn. It is expected that the committee will make a somewhat exhaustive investigation of the Brooklyn railways.

New York Rapid Transit Plans Approved.

The New York Board of Aldermen on Wednesday approved the plans submitted by the Board of Rapid Transit Commissioners and gave its consent to the construction of the underground road. Two votes only were recorded as opposed to the road. Alderman Olcott made the only speech on the resolution to approve the plans. He objected to the construction of a rapid transit railway underground. He believed it would not be conducive to the health of the working population of the city to be carried twice a day through an underground tunnel. The tunnel itself would not conduce to the health of the city, and he could see that there would be great difficulty in keeping the tunnel in a healthy condition. He felt that the people when they voted for the construction of the road with municipal funds had a different kind of a road in contemplation, a road to reach both sides of the city. In the present plans, he said, the residents of the Twenty-third and Twenty-fourth wards had been entirely overlooked, and he did not believe that the road was planned to extend as far as it should on the west side of the city. The estimated cost of the road on the present plans was $55,000,000, which is $5,000,000 more than the people had voted for, and it was possible that it would cost a still greater sum. He did not feel that the commission had selected the best plan, and therefore he did not find himself in personal agreement with the Rapid Transit Commission.

Trials of Fenders in New York.

The New York Board of Aldermen propose to make a number of practical tests next month to determine the value of street car fenders. The tests will be made on tracks on Twenty-eighth street which are not now in use. It is stated that inventors who will have working models made will be given an opportunity to demonstrate their fenders. The tests will commence some time in June and will continue for 90 days, if a sufficient number of fenders for experimental purposes are forthcoming. The board hopes to be enabled by the experience gained in this way to determine the type of fender with which street railway companies in New York should be compelled to equip their cars. The experiments will be conducted under the supervision of Alderman Robinson of the Railway Committee.

Regulation of State and Interstate Electric Railways.

At the meeting of the State Railway Commissioners, in Washington, last week, G. M. Woodruff, commissioner of Connecticut, read a paper on the "Regulation of State and Interstate Electric Railways." An abstract of the paper is given herewith.

The "railway problem," in which comprehensive phrase we have included all the multifarious questions pertaining to the management and control of steam railways, is yet far from solution, and now we are confronted with a new condition, as yet undefined; a new power in its application to commerce, a power still undeveloped and to a degree unknown, but apparently a power which is to supersede steam in many departments, and perhaps as a motive power in transportation on land and on water.

The steam road superseded the old stage lines, and the electric roads having supplanted the omnibus and horse car in their heretofore special department, are now seeking to supplant the steam roads in intertown and interstate transportation; and the question naturally arises as they assume the work and emoluments heretofore belonging to steam roads, whether they should not be placed under similar supervision, regulations, conditions and restrictions.

There are now said to be 850 electric railways in this country, having 9,000 miles of track, with 23,000 cars, and capitalized at $400,000,000, or about $44,500 per mile, all of which roads have been built or equipped within the past eight years, and most of them within the past three or four. So rapidly and quietly have they been constructed that not only have they taken possession of the streets of our cities and large towns, but have occupied our country highways, and though for obvious reasons still claiming to be street railways, have in fact become intertown railways with most of the privileges and few of the liabilities attaching to steam railways.

When the omnibus appeared, the fact that its patrons chose to pay another for their transportation rather than drive in their own carriages was properly not regarded as a new use of the streets; hence, when the horse railway succeeded the omnibus it was easy for the courts to hold that the mere changing of the form of the vehicle, and confining its course to a line of iron rails, conforming to the grades of the street, and so laid that vehicles could cross over them without obstruction and travel upon them, was not such a change of use as would make it an additional servitude.

In like manner when the change in motive power was made from horses to electricity, it seemed, at first, nothing more than an improvement in locomotion, and it was not till we found our streets and country highways occupied with the heavy and swift moving electric cars that we discovered that the electric railway was far more closely allied in its characteristics to the steam railway than to the old horse railway; and this discovery has hardly yet begun to affect either our legislation or our court decisions. Until recently the motive power used has been regarded as sufficient to differentiate a "railway" from a "street railway." A Connecticut statute says that the phrase "railway company" shall be construed to mean and include all corporations, trustees, receivers, or other persons that lay out, construct, maintain, or operate a railway operated by steam power, and a further provision is that no horse railway company shall use steam for motive power, and these two provisions have been regarded as sufficiently distinctive definitions. A distinction has also been made by our text books based on what has been a characteristic of the business of the respective corporations. So recent an authority as Elliott defines a street railway to be a railway laid down upon roads or streets for the purpose of carrying passengers, and says that the distinctive and essential feature of a street railway, considered in relation to other railways, is that it is a railway for the transportation of passengers and not for freight, and the definition given by Booth is almost identical; but the leading railway company of Connecticut is already equipping a branch line for the use of electricity, and other railway companies are doing like work, so that the motive power can no longer be regarded as sufficient to determine the distinction between a "railway" and a "street railway"; neither is the character of the business performed any longer distinctive, since electric roads are already engaged in all kinds of transportation in which steam roads are engaged.

We have not at hand any statistics up to date, but six months ago, at the time of the Atlanta convention of the American Street Railway Association, out of 413 companies reporting, all of course doing a passenger business, 35 were also doing express business, 55 were transporting freight, and 62 were carrying the United States mails, and this, too, notwithstanding the fact that in at least three States such companies were forbidden by general laws from carrying either express or freight, and like prohibitions were incorporated in charters granted in other States. It appears, therefore, that in practice the distinction based on the character of business done is disregarded, and the courts of at least one State—California—have declared that no good reason for the distinction exists, but that the transportation of freight by modern and improved methods is equally entitled to encouragement with the transporting of passengers, and equally demanded by the wants of the citizens.

Again, the old distinction based upon the location of their tracks no longer exists. Elliott defines a street railway to be one laid down upon roads and streets, and Booth says, "Street railways are those which are constructed in the streets, whether on, below, or above the surface." But the electric roads, while taking advantage of these routes provided for them without cost, do not confine themselves to the existing streets and highways, but have their own exclusive locations in the same manner as steam roads; and at last the courts in one State have placed these companies on the same footing as steam roads in denying their right to the occupation of the highways, outside of city limits, except by consent of and compensation to the adjoining proprietors.

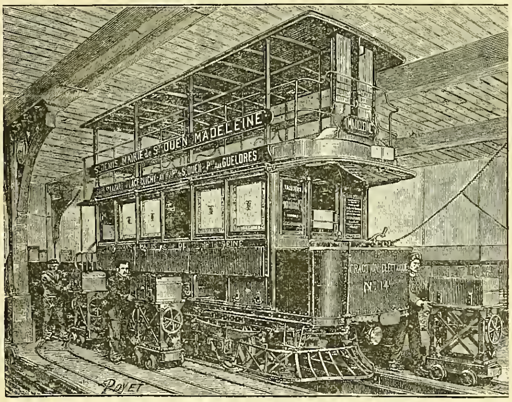
This Pennsylvania decision, if sustained, would place electric roads outside of city limits on the same footing with steam roads in regard to the necessity of securing their own right of way, and as a necessary incident thereto it would seem requisite that the right of eminent domain should be conferred upon them. Whether such right has as yet ever been conferred we do not know. So long as the construction of these roads was permitted in the streets and highways without compensation to adjoining proprietors no such right or power was required, and heretofore it has been the policy of their projectors to avail themselves of the privileges attached to the old horse railways, rather than seek additional powers which could only be exercised at a cost out of proportion to the privileges acquired. But if the electric roads, when they become intertown or interstate roads, are to be compelled to secure their own rights of way, and we believe they should be so required, then there must be at the same time conferred this right of eminent domain, as their construction would otherwise be impossible. The power of conferring this right, as well as the propriety of exercising it, rests with the legislatures of the several States, and the manner in which it should be exercised is within their discretion, subject, of course, to constitutional provisions, if any exist.

In all cases the use must be public as a foundation for the exercise of the right of eminent domain, and though the right be conferred upon an individual, as in the case of a mill owner, the right cannot be exercised till the tribunal named by the legislature has first found the taking of the lands will be of public use, or unless the legislature itself so finds.

In conclusion we would say briefly that it seems to us that electric railway companies seeking to build roads from one town to another, or through adjoining towns from one State to another, should be authorized so to do either by general laws or by special charters, with like privileges as steam roads, but subject to like conditions, restrictions, and regulations as to layout or location, especially at highway crossings, construction, operation and supervision, both State and interstate, as are applied to steam railways and railway companies.

Accumulator Traction in Paris.

At a recent meeting of the International Society of Electricians in Paris, J. Sarcia presented a paper in which he gave some interesting facts relating to the storage battery lines of the Tramway Company of Paris and the Department of the Seine. There are three lines which were equipped for accumulator traction in June, 1892. Previous to that time they had been operated by horses. The lines terminate near the St. Denis station and are known as the St. Denis & Madeleine, St. Denis & Opera, and St. Denis & Neuilly roads. The total length of the three lines is about ten miles. Since they have been operated by accumulator cars, the number of car miles on the system has exceeded 625,000.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EQUIPPING CAR WITH CHARGED CELLS.

The cars are designed to carry 50 persons—24 outside, 20 inside and six on the platform. They are mounted on double trucks and weigh, with the full complement of passengers, about 30,000 pounds. The track on the several lines is laid with rails of the Vignole type, weighing about 50 pounds to the yard. The grades are very slight, the greatest not exceeding 1.2 per cent. The cars are equipped with two motors, each having a capacity of 13 horse-power. Each car carries 108 storage batteries of the Laurent-Cely type each weighing 40 pounds. They are arranged in wooden cases of which there are six on each side under the car seats. The batteries have 11 plates each, the width and height of which are about seven and three-quarter inches.

The current for charging the cells is furnished by three Desrozier dynamos driven by a 125-hp Corliss condensing engine. The process of charging the battery lasts for about five hours. During the first two hours the charging current has a potential of 250 volts and during the last three hours 280 volts. The capacity of the cells is 230-ampere hours or 52-hp hours. When the cells are to be charged the car is run into the charging station and the batteries are brought to each side on carriers traveling on trucks, as shown in the illustration. The cost of the accumulator traction of the lines, including power, maintenance and handling of motors and trucks and the maintenance and handling of storage batteries, is slightly over 14 cents per car mile. A new car is shortly to be introduced on the line having cells of an improved type. According to the estimate of Mr. Sarcia, the cost of the operation of this new car will not be more than 10 cents per car mile.

Possibilities of Open Cars.

The number of those who patronize the open car during the summer months for pleasure solely is increasing rapidly. The traffic has developed in many cities to the point where special provision is made for trolley parties. Fortunately it is a luxury that can be enjoyed by the poorest. A writer in the New York *Sun* recently made the remark that the mitigating presence of the open cars was one of the pleasing accompaniments of warm weather in the metropolis. The open cars, it is stated, are the only vehicles that enable one really to know the town. Those that eschew them as democratic and dangerous to health sacrifice a vast deal to prejudice. One business man used to object to the open cars because he believed them dangerously exposed to the vapors arising from damp and, perhaps, unclean streets. Others regard them as too airy for the safety of weak chests and rheumatic joints. One man removed from Brooklyn to New York because the open cars in the former city began running too early in the spring and continued too late in the autumn. Perhaps it is fortunate for the spirits of those who ride in open cars that these careful persons take other conveyances. One can see at a glance that the company in the open cars is a cheerful one. Thousands use them as vehicles of pleasure, and even those that use them for business purposes manifestly feel that the journey combines pleasure with business. It is this feeling that the open cars are partly for the pleasure of the community that keeps them from being overcrowded at ordinary times. To be sure, one cannot always find a shady outside seat, but ordinarily a breezy seat of some sort is to be had. The air of one's fellow-passengers is most cheering, especially of the smokers in the rear—men with the careful manner erroneously ascribed to millionaires. To them, whatever the nature of the business awaiting them at their destinations, the journey thither is manifestly one of pleasure. Enjoying an easy motion, with comfortable elbow room, fanned by a constantly changing atmosphere, that one breathes without fear of blood poisoning, the poor man rides content, with the often unlovely but seldom uninteresting panorama of the streets displayed before his eyes. Sometimes the car takes one through quaint thoroughfares of the older town, where there are yet gambrel roofs and ample chimneys and carved doorposts. Sometimes it shows one the salt water. Sometimes it skirts a park. Sometimes it reveals the highlands well north on the island, and displays miles of territory urban and suburban and even rural.

Knowing folks without clubs, where they may wile away a spare hour or two between business appointments, cruise about town in the open cars to their own vast instruction and pleasure. A man with a bright, idle day on his hands cannot do better than deliberately set out to explore the town by way of the open cars. If he be really of an adventurous spirit he will undertake the expedition with a most exhilarating sense of the pleasure in store for him. Any expert could lay out several itineraries for such an explorer. He will hardy be content merely to ride. Monotonous as many of the long streets are, the explorer, new to remoter parts of the town, will see many things that he will wish to examine.

Comments and Views of Contemporaries.

Traveling for Pleasure.—The trolley railway lines are evidently going to do a great business this summer carrying excursion parties through the pleasant suburbs of the city, especially on fine Sundays, and it is tolerably certain that those companies will make the most money that give the best accommodations to the public. To make traveling for pleasure attractive they must provide plenty of cars and maintain good order.—*Philadelphia Public Ledger.*

New Speed Regulations in Brooklyn.—Within the more densely peopled parts of Brooklyn the trolley cars must now go not so fast as a lively horse or an energetic man can walk. From Flatbush avenue and Fulton street corner to the bridge the time is now 20 minutes. Walkers often traverse it in less. Before long the Yankee idea of planting a pumpkin vine, straddling it and riding it as and where it grows will be applicable here as a form of comparatively rapid transit—or as something faster than the rapid transit which the trolley system here assures under the latest regulations.—*Brooklyn Eagle.*

Upholstered Car Seats.—The *Picayune* hears complaint that some of the electric cars are furnished with seats upholstered with woolen material. The complaint is particularly made in view of the presence of smallpox in the city. Such upholstering, however handsome and otherwise comfortable, is liable to harbor germs of disease and for that reason is objectionable. The Japanese rattan matting in use in some of the cars is not subject to any such criticism, but, on the contrary, seems to be a desirable material. But bare boards would be preferable to any substance that can harbor disease.—*New Orleans Picayune.*

Open Cars.—The Common Council suggested a sensible reform in asking that open cars on street railways be guarded by a rail along the side next to the companion track, and that passengers be prohibited from standing between the seats. Our public, in this latter respect, is the most patient and submissive in the world. In no other country would they be required to submit to such impositions. Open cars are for hot weather comfort, and if heedless and selfish boors, of both sexes, are permitted to erect a wall of steaming and reeking flesh in front of those who occupy the seats, it would be better if open cars were not used at all.—*Boston Traveller.*

Elevated Roads Needed in St. Louis.—The city is almost built up to the extreme western limit already, and the same is true to a great extent both north and south. Longer distances will have to be covered by street cars, and it will be almost impossible for a good service to be given on the surface. With 600,000 population, the existing downtown terminals answer all purposes well, although at times there is enough overcrowding to cause difficulty and even danger. When the population is increased 50 per cent., to say nothing of being doubled, the present terminals will be entirely inadequate. Experience shows how hopeless it is to talk about new terminals and approaches to the downtown business streets. One or more elevated roads would seem to be the only solution of the problem.—*St. Louis Republic.*

The Successful Fender.—The most successful appliance for preventing harm is a rather crude device that projects a considerable distance in front of the car, giving warning to persons in peril, and affording the motorman time for action. So important, in the estimation of observers, is this matter of warning, that it has been proposed to paint the fenders some conspicuous color, in order that their appearance may be the more striking. It is becoming more and more evident, as the deadly work of experimenting with concealed snap-and-catch-'em contrivances goes on, that the only useful car-fender will be one that will pick up prostrate bodies before they come beneath the car platform; and that the only fender which can be relied upon to do this at all times will be one that projects in front of the car, and runs close to the track under every condition. But the managers of some of the lines say that they cannot use such a tender. They may have to. If it comes to that, they will find they can use a fender that projects six feet in front of the car as well as they could use a team of horses projecting twelve feet in front. But truck drivers will run over and crush such fenders, say some of the trolley and cable car men. They won't if they have to pay for it, and the present laws are ample to enable any street railway company to collect pay from any driver who, purposely or carelessly, damages the property of the company, or else to shut him up in prison.—*New York Sun.*

Notes from Foreign Papers.

In *L'Eclairage Electrique* for May 4 appears an illustrated description of the Claret & Vuilleumier surface contact electric railway in Lyons, France.

The *Elektrotechnischer Anzeiger* publishes an illustrated description of the electric railway in Gmunden, Austria. The installation was made by an Austrian company.

In the *Bulletin de la Societe Internationale des Electriciens* appears an interesting article by J. Sarcia on the results of accumulator traction on the lines from St. Denis to Paris and St. Denis to Neuilly. Storage battery traction was substituted for horses in 1892.

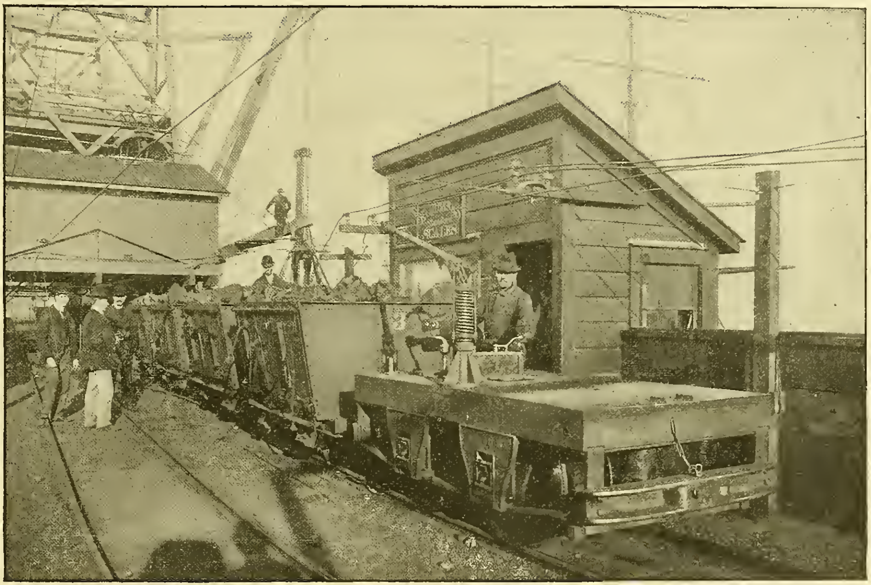
Engineering, in the issue of May 10, contains a continuation of Philip Dawson's admirable series of articles on "Electric Traction." He discusses at some length the matter of speed regulation and presents a table showing the saving of power when series parallel control is used as compared with rheostatic control.

The *Elektrotechnische Zeitschrift* for May 2 publishes a report by Dr. Palaz on a project for overhead trolley lines in Lausanne, Switzerland, using Dawson gas, gas engines and accumulators. A table is presented comparing the probable results of this installation with data obtained from several other electric railways in Switzerland.

Electric Tramway for Coal Haulage.

The accompanying cut illustrates an electric tramway used for coal haulage in San Francisco. The owners, R. Dunsmuir & Sons, being confronted with the problem of how to unload coal rapidly from steamships and colliers at the wharves and distribute it to the wholesale and retail trade, most economically, found the solution in the adoption of electrical apparatus.

The plant consists of an electric hoisting and haulage system for unloading the coal-carrying ships and steamers and distributing the coal into wharf and house bunkers for local and wholesale distribution. The wharf bunkers are built out upon a pier by the side of which colliers are moored for discharging, and the house bunkers are located in the main yard and connected with the wharf bunkers by means of a trestle and bridge 204 feet long and 35 feet above the level of the street.



ELECTRIC TRAMWAY LOCOMOTIVE DRAWING FOUR CARS.

The power house is a frame building 81 feet long by 88 feet in width, and contains a 300-hp boiler plant and two tandem compound McEwen high-speed engines, rated at 135 horse power each, belted to two 90-kw, 250-volt multipolar General Electric dynamos, running at 700 revolutions and over-compounded 10 per cent.

The hoisting plant consists of three special electric hoists, each having a capacity of 2,000 pounds lifted at a maximum rope speed of 800 feet per minute.

The motor is of the General Electric L. W. 2-type and the armature shaft is geared to an intermediate shaft by special gears with a very slight reduction in speed. The hoists are controlled by means of KR controllers of the usual type and are mounted in derrick houses.

The electric derricks are mounted on a track raised about six feet above the floor of the bunkers, and are so arranged that they can be moved along the wharf to accommodate themselves to the position of the hatches of the ships. The capacity of each derrick is 400 tons in nine hours, although they have, under favorable conditions, worked up to 450 tons in nine hours.

A portion of the coal is unloaded by the derricks directly into the bunkers on the wharf, but the larger portion is discharged into cars and hauled to the house bunkers by electric locomotives, one of which is shown in the illustration, with a train of four cars being weighed on the scales before delivery to the house bunkers. The locomotive is of the T. M. F. type and is equipped with General Electric motors. It has a draw-bar pull of 800 pounds and is required to haul from four to six loaded cars, each car weighing 3,600 pounds and having a capacity of 4,700 pounds of coal. The tracks are perfectly level and on the return trip the locomotive frequently brings back eight to ten empties.

On the bridge the usual overhead railway construction has been adopted, while on the wharf a special construction was rendered necessary on account of the limited head-room underneath the derrick.

The firm's bunkers handles about 250,000 tons of coal per annum and the adoption of electrical apparatus for hauling and hoisting under these conditions is significant.

Petition for Franchises Renewed.

The Union Street Railway Company has applied to the City Council of Brooklyn for franchises from the corner of Ferry place and Hamilton avenue to Union street, and thence through Union street to Ninth avenue. As compensation for the privilege, the company offers 3 per cent. of the gross annual receipts and $30,000 bonus. Franchises for the construction of an electric railway over these streets were granted to the Nassau Company by the Common Council, but were recently set aside by Judge Smith, on the ground that they were granted fraudulently and as a matter of favoritism. The Union Street Railway Company was a competitor for the franchises at the time they were given to the Nassau Company.

FINANCIAL NOTES.

CONSOLIDATION IN WESTFIELD.—The Woronoco and Highland Street Railway companies, of Westfield, have been consolidated.

SALE OF CHARLESTON RAILWAYS.—Both lines of street car railways are reported to have been sold to a Brooklyn syndicate, represented by John B. Hoefgen, Edgar Maxam and A. H. Walker.

INCREASE OF STOCK.—The New York State Railway Commissioners have approved an application of the Buffalo & Tonawanda Electric Railway for permission to increase its capital stock from $100,000 to $200,000.

PEOPLE'S TRACTION COMPANY EARNINGS.—It is stated that the earnings of the People's Traction Company, of Philadelphia, on May 5, were the largest in the history of the company, aggregating $7,501, an increase of $4,717, compared with the same day last year.

SALE OF VICKSBURG RAILWAY.—The Vicksburg Electric Street Railway Company's franchise and other property, consisting of a mile of track never operated and 250 acres of land, was sold last week to satisfy a New York mortgage, and was bought in by C. F. Tag & Son and J. H. Benedict, of New York, for $17,000.

EARNINGS OF THE UNION STREET RAILWAY.—The following figures are taken from the report of the Union Street Railway Company, of New York, for the quarter ended March 31: Gross earnings, $88,961; 1894, $93,440; net earnings, 1895, $30,690; 1894, $39,959; deficit, 1895, $513; deficit, 1894, $4,419. For the nine months ending March 31, 1895, the gross earnings were $332,288 and the net earnings were $146,809. For the same period last year the gross earnings were $337,483 and the net earnings were $173,276.

EARNINGS OF THE THIRD AVENUE COMPANY, NEW YORK.—During the quarter ending March 31, the Third Avenue Railway Company, of New York City, carried 11,602,480 passengers; this is an increase over the same quarter of last year of 3,890,720, or over 50 per cent. It cost $98,602 more to transport this increased business, but the net profit increased $85,934, or 65 per cent. The profits of the stockholders was greater than this, because other income was increased nearly $4,000, and charges decreased $200.

INCREASE IN STOCK.—The increase in the capital stock of the West Side Construction Company, of Chicago, from $3,000,000 to $5,000,000, is a practical certainty. The proposition was made at a meeting held in New York a few days ago, and received the most cordial support. Some of the largest holders of the stock were at that meeting, and over $1,000,000 of the new issue was subscribed for at par. It is believed it will be taken by present holders of the company's stock. None of the stock will be issued below par.

CONSOLIDATION RUMORS IN PHILADELPHIA.—There have been rumors of the consolidation of street railway interests in Philadelphia. The financial writer of the *Public Ledger* of that city says in regard to reports: "While there is an impression that a general consolidation will be effected eventually the feeling is that it will be a matter of several months at least. It is generally conceded that consolidation in this city can best be effected by the organization of a new company in which stockholders of the existing companies can have an interest."

PROPOSED CONSOLIDATION IN SIOUX CITY, IA.—A plan has been nearly consummated here for a consolidation of the local street railway lines Against the Sioux City Cable Railway and the Sioux City & Riverside Street Railway companies foreclosure proceedings are pending. Decrees will be taken soon by the creditors of the road, who will then bid the properties in at sheriff's sale and join the consolidation company. The Sioux City Traction, Sioux City & Leeds Railway, and Sioux City Rapid Transit companies are already in a position to enter the new company.

NORTHWESTERN ELEVATED BOND ISSUE.—Bonds of the Northwestern Elevated Railway Company are at once to be issued. The Columbian Construction Company, which is the company building the Northwestern Railway, has sent out circulars to stockholders of the construction company offering $2,000,000 of Northwestern Elevated bonds The bonds are to be placed at 90, with a stock bonus. The work which has been done so far on the Northwestern Elevated has been carried on with funds realized from the subscriptions to the stock of the construction company. Now that the real work of construction is at hand, a large amount of money will be necessary, and $1,800,000 in cash is to be raised from this issue of bonds.

CONSOLIDATION TALK IN ST. LOUIS.—The St. Louis *Globe-Democrat* says if the scheming now going on sub-rosa proves successful the public in the near future will be treated to a surprise in the shape of the announcement of the outright disposal of two or more street railway lines to eastern capitalists, or perhaps a consolidation of all the companies. For the past few months some of the eastern capitalists have had their agents in this city making an investigation of the St. Louis street railways. There is a syndicate of New York capitalists who make a specialty of street railway deals, the Seligman Brothers, bankers, being the abettors as well as the financial backers. They have made many successful deals within the past three years, and pretend to see a fair chance of adding St. Louis to their list.

ACQUISITION OF THE STEINWAY RAILWAY COMPANY.—The Steinway Railway Company has formal possession of the lines of the Flushing & College Point Electric Railway, of College Point, L. I. The Flushing road was sold April 4 as a result of the company's default on a mortgage given to the Atlantic Trust Company Dec 1, 1890. The property was purchased by a company organized to acquire possession, consisting of Daniel Odell, E. Bayard Halstead, Paul D Cravath, John W. Houston, V. K. McEthenny, Frank A. Dillingham, Philip F. Kobbe, Harvey Romer, and Charles Snow Kellogg, all of New York City. It was currently reported at the time that the purchase was made in the interests of the Steinway system, and the rumor has been made a reality by an official notice, served on the employees, to the effect that hereafter the road would be under the management of the Steinway officials.

STREET RAILWAY CONSOLIDATION.—The proposed consolidation of street railway lines in Pittsburgh shows that the tendency at present is toward the concentration of such roads into a single system, and under one management. This, however, was a development to have been expected; it is nothing more nor less than history repeating itself, says the Philadelphia *Stockholder*. It has not been many years since a similar tendency was marked among the steam roads of this country, with the resulting formation of several large systems by the consolidation of numerous small independent companies. Street railway managers will do well to study the combination then formed, and avoid, as far as practicable, the mistakes made in those consolidations, the greatest of which was, perhaps, the assumption of obligations wholly unwarranted by the values of the properties. Some of the largest systems now in the hands of receivers are there because fixed charges and rentals of lateral lines are wholly beyond the earning power of not only such roads, but of the parent company as well. The same end awaits the consolidation of street railways where a similar policy is pursued. In certain cases it is, of course, necessary to pay more for a road than it is really worth, so far as its earning capacity is concerned, but generally it is advisable if practicable, to effect leases on such terms as to be commensurate with the earning power of the roads acquired.

NEW INCORPORATIONS.

GRAND ISLAND, NEB.—The Street Railway of Grand Island has been incorporated with a capital stock of $25,000. The promoters are H. T. Julius Fuehrman, Henry C. Joehnk, W. S. Saiter, H. J. Joehnk.

CHICAGO, ILL.—The Suburban Electric Railway Company has been incorporated with a capital stock of $1,250,000. The promoters are Geo. I. Talbot, Jas. W. Kenney, Oscar L. McMurray, Homer K. Galpin, J. S. McClashan.

BALTIMORE, MD.—The Gwynn's Falls Railway Company has been incorporated by Joseph B. Seth, Henry Clark and others, to build an electric road in the western suburbs to Powhatan and Wetheredville. The capital stock is $30,000.

McKEESPORT, PA.—The McKeesport & West Newton Passenger Railway Company has been incorporated with a capital stock of $60,000, to build a passenger railway operated by electricity in Westmoreland County. The promoters are Homer H. Swaney, Jos. R. Henderson, F. W. Patterson, McKeesport, Pa.

JERSEY CITY, N. J.—The Sea Beach Construction Company has been incorporated with a capital stock of $100,000 to construct and equip electric street railways. Following are the names of the promoters: John E. Bowles, New York, N. Y.; T. Bridgewater Jones, Staten Island, N. Y.; J. Herbert Potts, Jersey City, N. J.

PEORIA, ILL.—The City & Prospect Heights Street Railway Company, capital stock $150,000, has been formed to construct, maintain and operate a street railway to be operated by horse, electric or other motive power. The promoters are W. S. Turner and Chas. Edwards, Woodbridge Ind., and Jno. C. White.

LA CROSSE, WIS.—The La Crosse, Black River Falls & Millsville Electric Railway Company has been incorporated. The capital stock is $300,000. The company proposes to build an electric road from La Crosse to Millsville. The promoters are N. Clark, P. McHugh, Wm. H. Polleys, T. J. McHugh, Wm. Burns, La Crosse, Wis.

SAN ANTONIO, TEX.—Alamo Heights Railway Company has been incorporated to operate street railways and suburban or belt lines of railways within or near San Antonio, Tex., by Chas. W. Ogden, C. L. Harwood, S. K. Buchanan, San Antonio, Tex.; Edwin Packard, Spencer A. Jennings, Brooklyn, N. Y. The capital stock is $62,000.

DENVER, COL.—The Citizens' Railway Company has been incorporated with a capital stock of $500,000, to build and operate electric railway lines connecting Denver with other towns in Jefferson and Boulder counties. The promoters are Milo A. Smith, Chas E. Hawver, E. S. Smith, Clarence M. Cobb, Thos. W. Porter, all of Denver, Col.

DENTON, MD.—The Harrington, Frederica & Denton Electric Railway Company has been incorporated with a capital stock of $350,000, by Robert W. Reynolds, Ezekiel Fleming, H. Harrington, B L Lewis and others to build and operate an electric road extending from Frederica to Burrsville and passing through the town of Harrington, thence to Denton.

MILWAUKEE, WIS.—The Milwaukee & Waukesha Street Railway Company has been incorporated with a capital stock of $1,000,000. Among those interested in the company are Max Rosenthal, James Pettro, A. B. Meyers, Stutley I. Henderson, Jacob Wellauer and Joel W. Bingham, of Milwaukee, and John J. Constantine, Charles Pettelkow and Andrew Snyder, of Waukesha.

CHICAGO, ILL.—The Sauburn Electric Railway Company has been incorporated with a capital stock of $250,000. The incorporators are James W. Kenney, Oscar L. McMurray, Homer K. Galpin, J. S. McGlashin, of Chicago, and George O. Talbot, of DeKalb, Ill. It is the purpose of the company to construct an electric railway from Chicago to towns in Cook, Lake and DuPage counties.

TAUNTON, MASS.—The Dighton, Somerset & Swansea Electric Street Railway Company has been organized with the following officers: President, Col. B. D. Davol, Fall River; clerk, Orville A. Barker, Taunton; treasurer, S. M. Thomas, Taunton. The directors are the officers and F. M. Brightman, of Fall River; Cornelius A. Davis and Henry B. Leonard, of Somerset; N. Allen Walker, of Dighton; J. N. Beckley and George Wellman, of Rochester; N. Y., and Henry H. Crapo, of New Bedford.

SYRACUSE, N. Y.—The Syracuse & Oneida Lake Electric Railway Company has been incorporated to operate an electric street road, 12 miles in length, the termini to be in the town of Cicero and the town of Salina, Onondaga County. The capital is $300,000, and the directors are Hiram McGonegal, of New York City; W. S. Wales, W. B. Kirk, J. B. Morgan, William O'Connor, Thomas W. Meacham, Edwin Lodder, James N. McCormack and William E. Wheaton, of Syracuse.

NEWS OF THE WEEK.

DETROIT, MICH.—Steel ties are being laid in the construction of the Griswold street track. The rails will weigh 98 pounds to the yard.

MOLINE, ILL.—An electric railway between Prospect Park and Moline Bridge is projected. Arnold Samuels and Charles Chapman are the promoters.

BLOOMINGTON, ILL.—A new street railway in Bloomington is projected. P. P. Mast and Samuel Martin, of Springfield, O., are interested in the project.

CINCINNATI, O.—The Consolidated Street Railway Company has decided to construct an extension to Hommettown, a suburb about half a mile outside the city line.

JACKSON, MICH.—A franchise has been granted to the street railway company to extend its lines to Vandercook's Lake. The improvement will probably be made this summer.

BOSTON, MASS.—It is stated that the next work to be awarded by contract by the subway commissioners will be the construction of the depot at the corner of Boylston and Tremont streets.

GREENFIELD, MASS.—H. C. Garfield of Leominster, has been appointed superintendent to take charge of the construction for the Greenfield & Turner's Falls and Montague street railways.

BROOKLYN, N. Y.—Three cars were run this week, for the first time, on that part of the Nassau Electric Railway, in East Broadway, Flatbush, which is not affected by the recent decision annulling the franchises of the company.

MOUNT VERNON, O.—It is proposed to construct an electric railway extending from Mount Vernon through Fredericktown, Luzerne, Chesterville, Fulton, Cardington and Mount Gilead. Fred W. Jones is at the head of the enterprise.

READING, PA.—At a meeting of the Allentown & Kutztown Electric Railway Company last week, it was decided to commence work at once. Bids for the construction of the line will be opened in Philadelphia within a few days.

CORNISH, ME.—An electric railway from Cornish to the New Hampshire line running through the towns of Baldwin, Parsonsfield, Hiram and Porter is projected. It is announced that sufficient capital has been pledged for the construction of the road.

WOONSOCKET, R. I.—The Woonsocket Street Railway Company has settled on a location for a five-mile electric line in Woonsocket via East Woonsocket and Cumberland Hill village to Mannville, to be in operation in six weeks, if the town of Cumberland will grant a franchise.

CHICAGO, ILL.—The Chicago City Railway Company has prepared plans for a considerable extension of its electric railway system. According to the report it will so cover Hyde Park with electric lines that competition by other surface companies will be out of the question.

DECATUR, ILL.—The suit of the Electric Railway Company against John A. Brown has been compromised by the defendant paying $300. The action was brought because the defendant refused to pay the subscription he had pledged for the construction of a part of the line.

YOUNGSTOWN, O.—The Youngstown Street Railway Company has decided to dispense with the services of conductors on the south side line, and place fare boxes on the cars. It is probable that if the arrangement proves successful the plan will be followed throughout the system.

MONTREAL, CAN.—The Montreal Park & Island Railway Company proposes to construct an extension this summer from Mile End to St. Laurent and Cartierville, a distance of about seven miles. J. R. Roy, the chief engineer of the company, is now making a survey of the line.

ASHLAND, PA.—Business men of Ashland are considering the construction of an electric line between Ashland and Centralia, a distance of about two miles. The proposed line will connect with the Schuylkill traction system and with the Shamokin, Mt. Carmel & Centralia Electric Railway.

PHILADELPHIA, PA.—Attorney C. W. McKeehan, to whom the matter of the Hestonville, Mantua & Fairmount Passenger Railway Company against the Forty-second Street & West Philadelphia Passenger Railway Company was referred has made his report in which he decides that the injunction asked for by the complainant should be refused.

CONSOLIDATION IN ST. JOHN, N. B.—The St. John Gas Company and the St. John Street Railway Company have been consolidated. They are merged on the following basis as to capital stock: Street Railway Company, $600 000; Gas Company $400.000. A proviso has been adopted that of the nine directors of the new company four shall be shareholders of the present gas company.

NORRISTOWN, PA.—A wooden bridge over the tracks of the Pennsylvania Railway Company's Trenton branch collapsed last Saturday and one of the Conshohocken Electric Railway Company's cars fell a distance of 20 feet to the tracks below. There were eight passengers on the car at the time. Three of them were quite seriously injured and the others were more or less severely bruised.

PHILADELPHIA, PA.—The petition of the People's Passenger Railway Company for a writ of quo warranto against the Union Passenger Railway Company and the Philadelphia Traction Company has been refused by the attorney general, who has affirmed the decision of his predecessor, giving the Philadelphia Traction Company the right to use the Girard avenue bridge and its approaches.

NEW YORK, N. Y.—The Board of Aldermen has granted permission to the Compressed Air Motive Power Company to experiment with a new system of street car propulsion by means of compressed air, on the Belt line tracks, from the station at 54th street, along Tenth avenue, to 34th street, and thence along the tracks of the Ninth avenue surface road, the time for the experiments not to exceed 90 days.

MILFORD, MASS.—W. B. Ferguson, of Boston, and his associates have made a proposition that if a reasonable franchise is granted them for an electric railway in Milford and that if the town would do the necessary grading, they would construct an electric railway between Hopkinson and Milford. If the line is constructed there will be a continuous electric railway connection from Boston to Milford.

PITTSBURGH, PA.—Dewees Wood and H. Kirk Porter have brought an action against the Pittsburgh Traction Company to compel it to abate a smoke nuisance at the Oakland power house. The complainants ask that an injunction be issued restraining the defendant company from using bituminous or semi-bituminous fuel in its furnaces until such alterations are made as in the judgment of the court will prevent the continuance or repetition of the nuisance.

NEW YORK, N. Y.—The annual meeting of the West Side Construction Company which is building the Metropolitan West Side Elevated Railway in Chicago was held here on May 13. A. F. Wallcott resigned as director and W. G. Oakman, president of the New York Guaranty & Indemnity Company, was elected to fill the vacancy. The other directors elected were: R. Somers Hayes, Charles F. Dietrich, F. P. Olcott, Samuel Thorne, G. G. Clark and Henry L. Higginson, of Boston.

CLINTON, N. Y.—A meeting was recently held to consider the advisability of forming an electric railway company to construct a line to New Hartford to connect with the belt line to Utica. It was estimated that about $50,000 would be required to make the improvement. Among those interested in the project are O. W. Kennedy, Prof. A. G. Benedict, J. L. Dempsey, W. H. Allen, Leroy Hathaway, C. J. Cauldwell, G. H. Allen, Dr. G. H. DeNike, E. P. Powell, Ellery Stebbins, Francis Tucker and T. E. Dempsey. Committees have been appointed on subscription, right of way and for conference with the officials of the Utica belt line.

PHILADELPHIA, PA.—Justice Miller on Tuesday delivered an opinion reversing the decision of the lower court in the case of the township of Plymouth against the Chestnut Hill & Norristown Passenger Railway Company. He granted a perpetual injunction against the construction of the road in that township. A petition was presented to the court from a large number of residents of the township, asking that the company be allowed to continue the construction of the road and that the injunction proceedings be dismissed. The court, therefore, granted a stay, which leaves the matter in substantially the same shape as if the decision had not been granted.

NORRISTOWN, PA.—A bill in equity has been filed by the supervisor of Plymouth township against the Chestnut Hill & Norristown Railway Company, with an application for an injunction to restrain the latter from tunneling under the tracks of the Pennsylvania Railway Company's Trenton branch. The railway is constructed on the Germantown turnpike, which crosses the Trenton branch at grade, and it is to escape a grade crossing that the railway company desires to depress the turnpike at that point. The alteration, the bill recites, will render the township liable for damages to persons whose properties abut on the turnpike. The complainant asks the court to direct the railway company to remove its tracks, poles and wires from the turnpike.

NEW YORK, N. Y.—Harry B. Hollins, Fernando A. Yznaga and others have obtained from Judge Ingraham, of the Supreme Court, a temporary injunction, restraining the New Orleans Traction Company from paying the principal or interests on notes aggregating $130,000 made under resolutions of the board of directors of the company and adopted at a meeting of the company held on Nov. 28 last. The injunction also restrains the company from taking any steps to reimburse certain persons for advances made on the formation of a syndicate for the purpose of assisting the company, and enjoins it from parting with possession of the notes, and also restrains the corporation from paying out any amount in consideration of advances made for 7,500 shares of stock.

WORCESTER, MASS.—The Selectmen of the towns of Spencer, Brookfield, West Brookfield and Warren have granted franchises to the Warren, Brookfield & Spencer Street Railway Company to build an electric railway, connecting the villages of Spencer, East Brookfield, Brookfield Warren and West Warren. The stockholders are to meet at once to perfect a temporary organization and secure incorporation under the general railway law. The line is to be 15 miles long, making, with the Worcester & Suburban Company's tracks, an electric line 27 miles long, from Worcester to West Warren. The capital stock will be $200 000. Citizens of the towns interested have subscribed liberally and there are assurances that the balance of the money required will be furnished by Boston capitalists. It is expected that the road will be ready for operation in the fall.

TRADE NOTES.

THE PHILADELPHIA ENGINEERING WORKS, of Philadelphia, Pa., has just issued a pamphlet in which the steel plate chimneys manufactured by the company are described. The company has constructed a considerable number of chimneys of this type for electric companies, and the pamphlet contains testimonials from a number of these companies, expressing the satisfaction which they have given in service.

THE C. W. HUNT COMPANY, of 45 Broadway, New York, has recently issued a pamphlet devoted to the description and illustration of their equipment for industrial railways. The matter is taken up quite exhaustively and data are presented showing the economy that attends the installation of such railways in manufacturing establishments and power plants. The track construction, cars, etc., are very completely illustrated and described.

BERLIN IRON BRIDGE COMPANY'S CONTRACTS.—The steel frame for the extension to Gardes Hotel, New Haven, Conn., has been completed by the Berlin Iron Bridge Company, of East Berlin, Conn. The new boiler house for the Piercefield Paper & Mining Company, at Piercefield Falls, N. Y., has been completed by the builders of the Berlin Iron Bridge Company. The same company is putting up a new car barn for the Wilkesbarre & Wyoming Valley Traction Company, at Wilkesbarre, Penn. The building will be 73 feet in width and 223 feet in length.

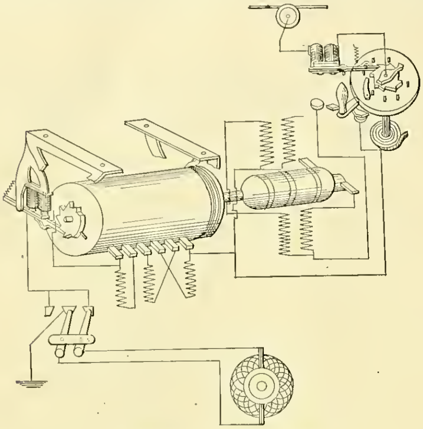
EDWARD F. AUSTIN, manager of the Pittsburgh office of the Phœnix Works Company, of Meadville, Pa., manufacturers of the improved Dick & Church automatic cut-off engines, reports the following recent sales: One 16x15 Dick & Church automatic cut-off engine to the National Water Works & Construction Company; two 300-hp Dick & Church engines to the Detroit & Mt. Clemens Electric Railway; three 14½x15 automatic cut-off engines to the National Tube Works Company, of McKeesport, and one 18½x18 Dick & Church automatic engine, together with two boilers, feed water heater, pump, etc., to Robert Simons, president of the Pittsburgh, Frontenac & Suburban Railway, of Pittsburgh, Kan. Mr. Austin reports the boiler department running to full capacity and the outlook for business good.

Record of Street Railway Patents.

UNITED STATES PATENTS ISSUED MAY 14, 1895.

539,024. ELECTRICAL CONNECTOR; Frank N. Bell, Milford, Mass. App. filed July 28, 1894. An outer thimble of the conductor has one end closed to a centrally located bolt hole. The thimble walls are split upon one or more lines in the direction of the length. An inner sleeve or thimble has a tapering exterior surface adapted to enter the hole of the outer thimble and expand the latter when subjected to end pressure from a screw bolt or bent connecting rod passing through the thimble and sleeve.

539,042. CAR FENDER; Albert Edwards, Brooklyn, N. Y. App. filed Feb. 9, 1895. A U-shaped support is screwed to the under side of the platform and at its outer end. There are slotted lugs on the under side of the car at some distance from the support. Sliding bars rest in the lugs and on the support. A frame is pivoted between the outer ends of the bars and to its inner rear edge a flexible piece is secured at the front of the car platform.



No. 539,293.—Controller.

539,048. CAR FENDER; Andrew E. Flattick, St. Louis, Mo. App. filed Jan. 28, 1895. The life guard comprises a rigid frame which carries at the forward end a spring controlled buffer. There is a hinged frame normally inclined to the buffer and out of contact therewith. At the free end of the pivoted or hinged frame there is a cushioning device and yielding supports sustain the free end of the frame when in its depressed position, means being provided for locking it in this position while suitable springs restore it to its normally inclined position.

539,050. CAR FENDER; William B George, Columbus, Ohio. App. filed Dec. 6, 1894. The fender is composed of several bars, the central ones being shorter than those at the side, but all curved at the rear end, so that the outer end of the fender swings in the arc of a circle when the fender is moved outward. The central bars assume a higher plane than the outer ones when the fender is in its projected position. Means are provided for moving the fender in and out.

539,134. CAR FENDER; Henry P. Johnson, San Francisco, Cal. App. filed Aug. 16, 1894. A cross beam is supported upon brackets at a suitable distance in front of the car. There is a gradually curved part and an intermediate circular bend immediately beneath the beam, spring metal fingers being provided at the upper and lower extremities. A horizontal part passes through and is secured to the cross beam. Loops connected by a continuous flexible piece and tie bolts secure the fingers at a point intermediate of their ends to the cross beam.

539,169. CAR FENDER; Andrew J. Collier and Philip M. May, Washington, D. C.; said May assignor of his entire right and said Collier assignor of one third of his right, by direct and mesne assignments, to George P. Davis, same place, and William B. Dickey, New Orleans, La. App. filed Sept. 1, 1894. Guard planks supported independently of each other act conjointly to close the entire space in front of and between the wheels. Independent suspending mechanism is provided for each of the planks, and releasing mechanism with a single trip attachment is arranged in front of the planks for automatically and simultaneously tripping both of them.

539,184. CLOSED CONDUIT ELECTRIC RAILWAY; Paul Lucas, Berlin, Germany. App. filed June 23, 1894. Patented in Belgium, March 12, 1894, and in Germany, June 15, 1893. The continuous closed casing has stationary contacts arranged at intervals, a conductor being located in the casing. A series of rocking arms each carrying a contact electrically connected with the conductor, and a series of vertical movable plates in the roadbed electrically connected with the stationary contacts are provided. Rocking levers are used, having one end arranged so that it may be depressed by the car and simultaneously raised by means of connections with plates and rock the arms within the casings so as to connect the plates with the conductor.

539,232. AUTOMATIC SWITCH FOR RAILWAYS; Andrew C. McKenzie, Brooklyn, N. Y. App. filed Jan. 25, 1895. A switch rod having a switch arm at its lower end is carried by the car. A guide wheel is wholly supported by the switch rod and connected to it so that there may be a rotary movement of the wheel relatively to the axis of the rod. There is a stop provided to control the extent of the rotary movement, consisting of a collar having shoulders and adjustably mounted on the switch rod.

539,242. CAR WHEEL FOR ELECTRIC CARS, ETC.; Charles Thompson, Oswego Falls, assignor of one half to George F. Emeny, Fulton, N. Y. App. filed Nov 22, 1894. This is a compound or two-part wheel. The tread-carrying portion is journaled upon the axle and is provided with a recess on its inner side. An associate portion is rigidly fixed to the axle and means are provided for holding it and the rigid portion in juxtaposition. The clutch mechanism is mounted on the rigid portion for coupling the two parts of the wheel together.

539,256. CAR WHEEEL AND AXLE; Louis S. Flatau, Dallas, Texas, assignor of one half to Samuel H. Shannon, same place. App. filed Feb. 14, 1895 This is a compound or built-up metallic wheel comprising dished side plates, flanged and riveted rim, hub nuts and lock plate.

539,265 FENDER FOR STREET RAILWAY CARS; Charles R. Hall, Philadelphia, Pa, assignor of one sixth to Louis Bash, same place. App. filed Sept. 29, 1894. There is a swinging frame which is supported from its upper bar in bearings arranged in any convenient position upon the under side of the platform. The pivotal receiver or bed is constructed for simultaneous movement with the frame. A protecting sheet of cloth extends between the receiver and the brackets. The operating mechanism is upon the under surface of the platform.

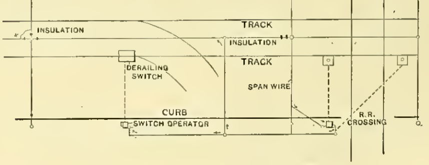
539,281. CAR FENDER; Marguerite Maidhof and Victor F. Maidhof, New York, N. Y. App. filed July 30, 1894. A spring-controlled plate is suspended beneath the car having a limited movement to and from the car. A pivot plate is provided with a curved slot in which there are guide blocks located above and below the pivot plate. Each block is provided with roller bearings engaging with the plate and has pivotal connection with the fender.

539,293. CONTROLLER FOR ELECTRIC MOTORS; Horace F. Parshall and John W. Darley, Jr., Lynn, Mass., assignors to the General Electric Company, New York. App. filed Feb. 11, 1893. There is an electric motor for actuating the controller cylinder. An index is operated by the switch, means being provided for returning the index to zero when the line current is broken. The field coils of the motor are in two sections of different relative resistance, the section having the lower resistance being in series with the armature and the other being in shunt therewith and wound in reverse direction. (See Illustration).

539,299. ELECTRIC TRACK SWITCH; Joseph Y. Porter, Cleveland, Ohio, assignor to J. W. Morrison, Detroit, Mich. App. filed Feb. 14, 1894. The switch is operated by electromagnets. There is an insulated section of trolley wire adjacent to the switch extending one or more car lengths or less on each side of the switch. Means for making the electric circuit operative are adapted to control simultaneously the electromagnetic device and the insulated section of trolley wire. (See Illustration).

539,342. CAR GUARD OR FENDER; James O. Brown, Boston, Mass., assignor to himself, Rolon E. Foster and Robert B Graham, trustees, same place. App filed Jan. 10, 1895. Inflexible links are pivoted to the car and to the central portion of the guard. Flexible links connect the rear end of the guard with the car so that there is a free vertical swinging movement of the rear end of the guard. A retracting spring is applied to the guard and means are provided for swinging it forward.

539 381. APPARATUS FOR INDICATING AND SIGNALING SPEED OF VEHICLES; John W. Darley, Jr., Baltimore, Md., assignor of one-half to Michael Holzman, Philip Hamburger and Leon Hamburger, same place. App. filed March 29, 1894. A wheel is provided which revolves at a speed proportional to that of the vehicle and operates a speed governor. A contact-making device is operated by the governor. A hammer is connected with the armature of an electric magnet which is adapted to strike the hammer. A sliding bar moves in a direction approximately parallel to the plane of the armature and a contact piece connected to the wire is wound upon the electromagnet and is adapted to be struck by the bar as the magnet nears the end of its travel. The projections upon the bar are adapted to engage with the armature.



Street Railway Gazette

No. 539,299.—Electric Track Switch.

539,385. OPERATING FENDERS FOR STREET RAILWAY CARS; Charles R. Hall, Philadelphia, Pa., assignor of one half to Charles E. Jones and Louis Bash, same place. App. filed June 27, 1894. A supplemental fender is hinged at its upper edge to the lower surface of the car platform and is pivotally connected at the upper edge to a sliding rod. The fender is pivotally connected by means of side rods to the bearings. The apex of the fender is adapted to engage with the rear end of the rod whereby an inward swivel movement of the supplemental fender releases a hook from contact with the inner end of the rod and permits the fender to descend to the surface of the track.

539,395. TRACK SANDING DEVICE; John U. Schiess, Brooklyn, and Josef Duester, New York, N. Y. App. filed Sept. 19, 1894. A valve is adapted to reciprocate and is free to rotate, having stirring arms connected with the valve for causing its rotation.

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Vol. XII. NEW YORK, JUNE 1, 1895. No. 22.

The Hestonville, Mantua & Fairmount Passenger Railway Company.—I.

The Hestonville, Mantua & Fairmount Passenger Railway Company is one of the old companies of Philadelphia which until comparatively recently operated its lines by horses. It was decided in 1893 to equip the system for electric traction to meet the demands of the patrons of the road for better transportation. In that year the company appointed A. Langstaff Johnston chief engineer, under whose supervision the improvement has been made. The system was opened for traffic Dec. 1 last, and the work is now substantially completed in all departments, but the equipment of new lines which have been acquired by the company is now in progress.

The railway passes through the business districts of Philadelphia and reaches some of the most desirable residence localities of the city. The lines run through Arch, Race and Vine streets, cross the Schuylkill River and extend as far out as Fairmount Park at Fifty-second Street. The system comprises about twenty miles of track.

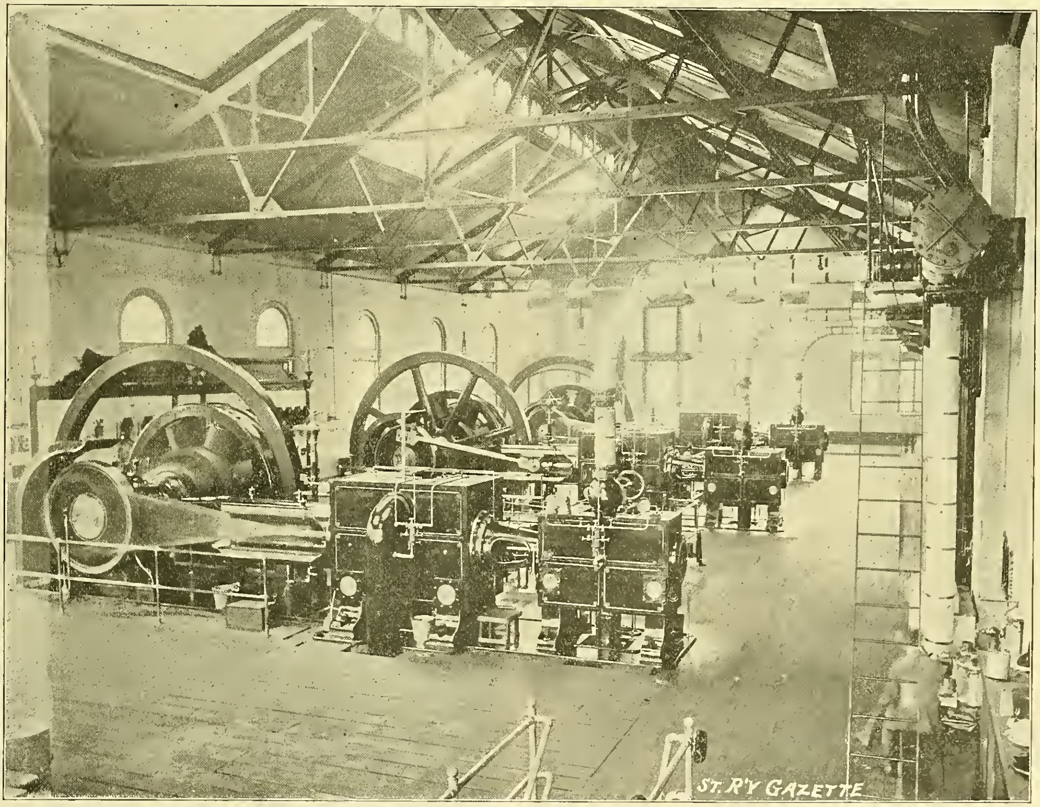

FIG. I.—ENGINE AND GENERATOR ROOM.

The power house, which is located on the Schuylkill River at Twenty-fifth and Callowhill Streets, is a handsome structure with a frontage of 112 feet and a depth of 150 feet. This location, which is practically in the centre of the system, is desirable in every respect. Coal is brought to the rear of the station in barges, whence it is carried by conveyors to coal pockets adjoining the boiler house. From the Schuylkill River water for feed and condensing purposes is obtainable. The station is constructed of brown stone from the level of the street to the engine room floor, and above that point of Pompeiian brick, with terra cotta trimmings. The slate monitor roof is supported by iron trusses, and abundant provision is made for light and ventilation. The foundations for the massive structure are unusually heavy. The north wall rests directly on bed rock which comes within six feet of the surface at this point, but slopes off toward the river so that it was necessary to drive piles for the side walls, and for some of the engine foundations. The piling which was cut off at mean low water was covered with a layer of concrete to a depth of two feet, on which the foundations were built.

The dimensions of the engine room, Fig. 1, on the west side of the building, which is light and well ventilated, are 150 by 64 feet. Power is furnished by three tandem compound condensing Greene engines, with 18 foot fly wheels, built by the Providence Steam Engine Company. The engines, which have given great satisfaction in service, make 100 revolutions per minute, and have a rated capacity of 500 hp, though they have developed power greatly in excess of that capacity. A fourth engine will soon be added to the plant.

During a recent ten-hour test the speed of the engines was taken every ten minutes, the loads varying from 200 to 800 hp. It is stated that the maximum variation did not exceed one third of a revolution.

The main steam pipe is wrought iron with riveted cast-steel flanges, and is carried on brackets inside of the engine room. The same brackets support a small gallery extending from one end of the room to the other. By-pass gates valves are so located that the boilers may be shut off and the steam main may be cut in sections. Stop valves are placed in the branch pipes from the main to the engines, and are worked from the floor by cords in case of an emergency. The valves can also be operated from the office of the engineer in charge. In case it may be desirable to shut off the high-pressure cylinder, additional branch pipes are provided which lead from the steam main to a reducing valve under the engine floor through steam which is passed into a receiver and thus to the low-pressure cylinder.

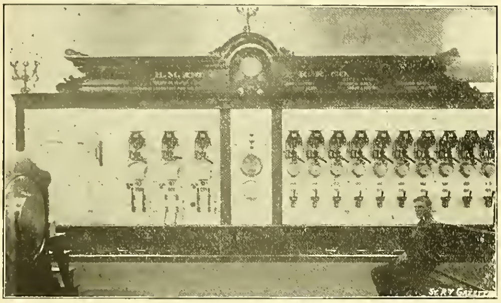

FIG. 2—SWITCHBOARD.

The condensers, which are of the Deane independent type, Fig. 4, are located under the floor of the engine room. The chief engineer has designed a simple but effective device in connection with condensers, for use in an emergency where it may be desirable instantly to destroy the vacuum. A pipe connected to the condenser leads to the engine room, and attached to it is a quick opening valve located conveniently near the engine. By means of this device, and a small catch on the governor, the danger that an engine may run away because of an accident is reduced to a minimum.

The generators, Fig. 3, which are of 400 kw, are multipolar machines, and were furnished by the General Electric Company. They are directly connected to the engine shafts and are operated at a hundred revolutions per minute.

The switchboard, Fig. 2, which is unusually handsome, was designed by Mr. Johnston, the chief engineer. It is thirty feet in length and is constructed of panels of Italian marble, with a handsomely decorated oak frame, with groups of lamps at the centre and at the ends, mounted on brass standards.

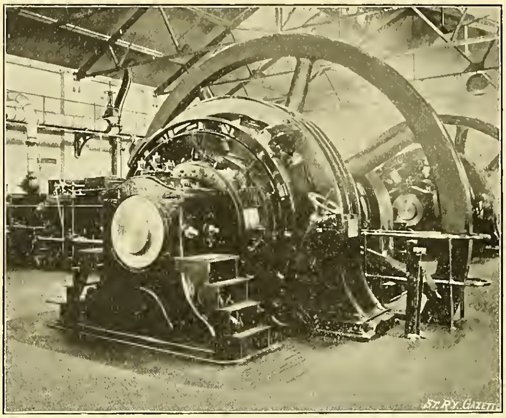

FIG. 3—ONE OF THE GENERATORS.

The names of the designer and of the officers of the company, appear in gold letters on a panel arranged for the purpose at the top of the board. The feeder panels, which are on the right side, are provided each with a circuit breaker, Weston ammeters and voltmeters and Ajax switches. Attached to the centre panel, which is separated from the rest of the switchboard by ornamental oak columns, are a recording wattmeter and a general station ammeter. The station controlling instruments will be located on the left panels. At the extreme left a swinging bracket carries two Weston voltmeters, which can be brought into circuit with any of the generators. All the connections are carried under the floor from the generator to the switchboard and from that point under

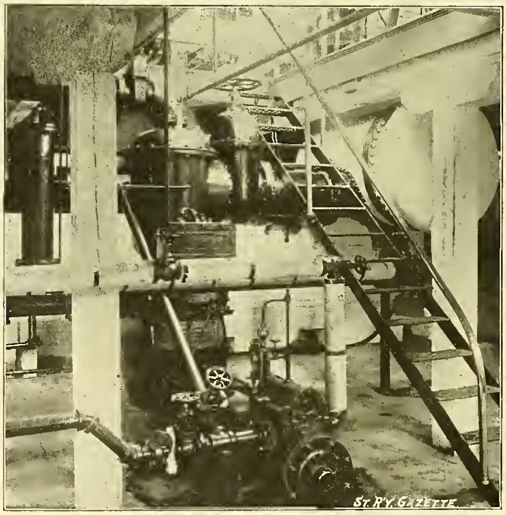

FIG. 4.—CONDENSERS.

the floor to a testing room under the northwestern part of the station, and thence to the conduit. In the testing room a complete set of testing instruments, mounted on a solid brick base resting on the bed rock, is provided. The return cables, as they enter the building, are to be tapped, and will be connected with an ammeter on the switchboard.

Speed Indicator.

The device which is shown in the accompanying illustrations was designed to indicate the speed of street cars and thus serve as a check on a motorman inclined to violate speed regulations. A patent for the invention has recently been granted to J. W. Darley, Jr., of Baltimore, Md. Two wires are connected to the lamp circuit, one of which passes through a resistance coil or lamp and a switch, and is grounded to the car truck; the other passes through a signal ball and an indicator, and thence to the trailing wheel in contact, which revolves by contact with the track when the car is in motion.

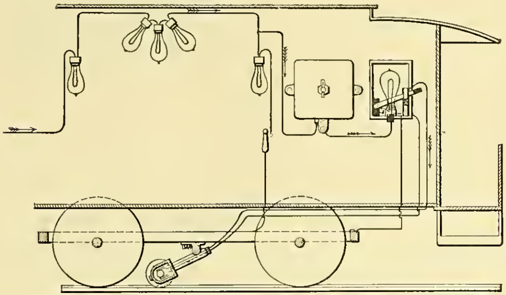
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FIG. 1.

If the switch is open as in Fig. 1, the current will flow through the bell and indicator, but only part of the current from the lamp circuit will flow to the ground. The resistance, which in the diagram is a lamp, will cause the rest of the current to pass through the bell and indicator circuits to the ground. Connection is made electrically between one of two wires leading from the indicator and the ground, by means of the trailing wheel already referred to. The wheel is held by a collar on a shaft, which is journaled in a sleeve attached or integral with a box whose upper part is closed by a cap. Washers protect the bearing from mud and dust. Attached to the box is a hollow arm which is pivotally held by journals secured to the truck, and which is provided with a lever arm. The arm engages with a spring that tends to keep the wheel on the track. The upper end of the hollow arm is closed with insulating material. The shaft on which the wheel is mounted carries a sleeve, one end of which is tapering and the other end is provided with slotted lugs. The frame, which is rigidly attached to the spindle on the rear of the sleeve, is bent forward to form bearing arms for the pivots of bell crank levers that are weighted in front and drawn together by springs. The outer ends of the levers terminate in rollers or cylindrical pins engaging in slotted lugs. It will be seen that as the spindle is rapidly revolved, the weighted levers will tend to fly outward against the action of the springs, causing studs or rollers to push the sleeve forward. The faster the spindle revolves, the farther will the sleeve move forward. Contact strips are mounted on screws, by means of which they may be moved forward or back in the line of the travel of the sleeve. The contacts may be adjusted by means of the screws, so that the sleeve will strike them whenever the wheel attains any velocity. As the velocity of the wheel will determine upon the speed of the car, it will be evident that the position of the contact pieces may be so adjusted that contact with the sleeve will be made whenever the car attains either one of two predetermined speeds.

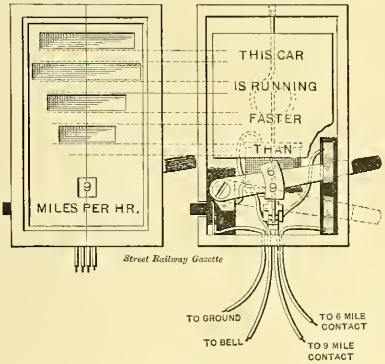

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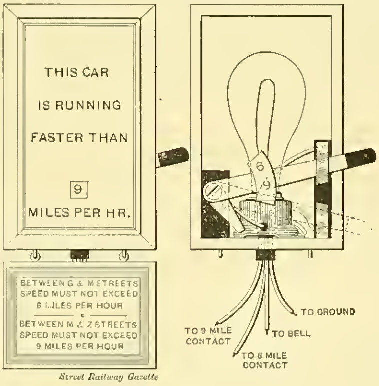
FIG. 2.



BETWEEN G & M STREETS
SPEED MUST NOT EXCEED
6 MILES PER HOUR
BETWEEN M & Z STREETS
SPEED MUST NOT EXCEED
9 MILES PER HOUR

Street Railway Gazette

FIG. 3.

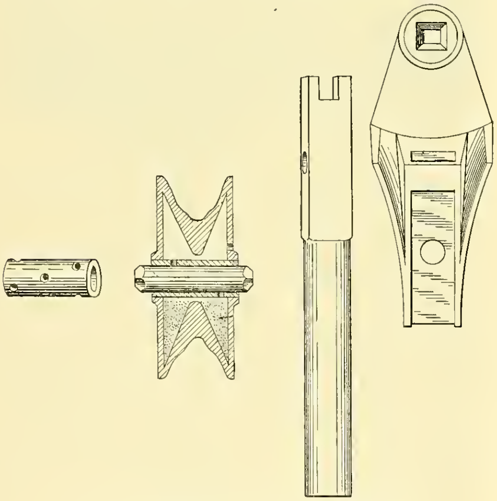
The indicator, which is provided with an electric lamp, is blackened on the interior, so as to show no sign when the light is out. The face is opaque, with translucent slots, which form some such indications as "This car is running faster than" as shown in Fig. 2. Below are spaces for the numerals and still lower, "Miles per hour." The numerals 6 and 9 representing car speed are mounted in the indicator box on a lever, which can be thrown in contact with either of the terminals of the wires leading from the contact pieces already described. As the car moves along, therefore, the trailing wheel revolves, and as speed increases, the sleeve is pushed forward farther and farther until the speed limit is reached when it strikes the contact pieces, completing the circuit and causing the illumination of the lamps and the ringing of the bell. Fig. 3 shows a modified form of the same device.

Motormen and Conductors from Country Districts.

The *Dispatch*, of Columbus, O., quotes Superintendent Scranton, of the Columbus Street Railway Company, as stating that the best motormen and the least capable conductors come from the country. "The boy from the country," he says, "is not accustomed to meeting strange faces every moment of the day, and speedily becomes embarrassed; a very little unnerves him; a passenger may be somewhat gruff, and it instantly throws the conductor into agony, and he loses his equanimity, and is so 'rattled' that his usefulness for that trip is gone. It never comes natural to him to preserve his even poise of mind so that he can take a passenger's groutiness for what it is worth. He makes a splendid motorman, however, and why I hardly know, but he does."

Combined Trolley Head and Wheel.

A patent has just been issued to William A. Dalbey, of Indianapolis, Ind., for a combined trolley head and wheel, which is designed to be strong, but easily repaired if broken, while means for continuously applying lubricant to the journal of the wheel are provided. The device consists, first, of a hollow wheel having an opening through which suitable lubricant may be inserted in the hollow chamber. A bushing is provided with openings through which the lubricant will gradually diffuse itself upon the journals. The journal ends are slightly tapered and squared to fit like apertures in two sides of the pieces forming the head. The lower ends of the head pieces are formed with grooves of sufficient depth to form a square opening when the two head pieces are placed together. The upper end of the trolley pole is squared for a sufficient length to fit the square opening in the head, and is provided with an opening corresponding to openings in the head, through which a bolt is passed.



PARTS OF TROLLEY HEAD AND WHEEL.

It will be seen that the head sections can be quickly laid together, with the wheel between them, and the end of the trolley pole can be inserted in the square opening formed by the grooves.

Surrounding the apertures on the inner faces of the head pieces are circular boxes, which are to fit over and against the hubs on the wheel, thus making a continuous connection between the head and the wheel for the passage of the current. The bolt is then inserted through the openings of the head pieces and arm, thus preventing the withdrawal of arm, and at the same time giving additional strength to the various parts by binding them together more firmly. The journal is held against turning by means of the squared ends, which fit in the squared apertures. A sufficient quantity of lubricant may be inserted into the chamber to thoroughly lubricate the bearing for a long time.

The Proper Form of Rail for Street Railways.

At a recent meeting of the Engineers' Club, of Philadelphia, Wilfred Lewis contributed the following form of rail for street railways:

"The rail tread now generally in use, and still extending in all directions, was originally designed for horse cars when cobblestone pavements were the penalty for turning off the track. Then it was desirable that the rail should be of such form as to keep a wagon from running off, because the pavements were universally bad, and travel was not impeded by vehicles moving at about the same rate as the cars. Now we have pavements just as good as a rail to drive on, and better in fact, because there can be no side strain on the wheels as the horse swerves from side to side, cars moving at railway speed and the same old rail tread, which catches and holds everything that attempts to escape. The track is practically useless for driving purposes, because a vehicle no sooner starts than it is obliged to turn out for the next car, and in order to turn out the horse must be brought to a walk and pulled around almost square before the front wheels will mount the sides of the rails. Thus, the transit of passengers is continually delayed, driving through the streets is tedious, difficult and dangerous, and as an insult to the injury imposed upon the public by the use of such a rail, we have an ordinance that teams must not delay the progress of trolley cars. The grooved rail on some of our street crossings, and quite generally used in other cities, would avoid all this trouble. Is it not within the province of the Engineers' Club to express itself strongly on this subject and exert its influence to have a decent rail adopted for use in this city?"

The communication was commented upon by William Wharton, Jr., as follows:

"The question, as stated by Mr. Lewis, has been argued by the public for many years, the trouble being that everybody having a vehicle to pull expects to use the rails, and consequently loads it with about twice as much as it can well draw upon a street pavement. There are many objections to the grooved rail. If the groove is made wide, the wheels of light carriages get into it and are badly wrenched in turning out, while, if the groove is narrow, it soon becomes filled with dirt, and in winter, with snow and ice. In New York City they even found it difficult to keep the cars on the track from the latter cause. Personally, I believe that the Philadelphia tramway is the best for all concerned. Two years ago, when a certain road in Baltimore was to be extended, the grooved rail was used on the new part with the result that ruts were soon worn on both sides of the rails, and vehicles were constantly catching in them."

The Indianapolis Accident Swindlers.

BARNEY GINSBERG.

In the STREET RAILWAY GAZETTE for May 18 mention was made of the fact that three swindlers had been arrested on the charge of attempting to defraud the Citizens' Street Railway Company, of Indianapolis, by a bogus accident claim. The plan was exceedingly simple. It was alleged that one of the trio, a woman, had been injured when leaving a car which was claimed had been carelessly started too soon. One of the men known as Barney Ginsberg, alias Schwartz, claimed to be the woman's husband, and demanded damages from the company. The third member of the party, Joe Stein, played the part of a disinterested witness who had seen the accident and volunteered to substantiate the assertions of Ginsberg at his interview with the officers of the company.

The manner of the claimants was such that suspicion was excited. Mr. Thomas H. McLean put detectives on the track of the men, with the result that all their statements were found to be false. It was discovered that the woman had not been injured, that Ginsberg was not her husband, and that Stein was not a stranger to them, but was an intimate associate. It was also learned that the two men had been previously engaged in attempts to defraud transportation companies by trumped-up accident claims.

JOE STEIN.

It was decided to cause their arrest and to prosecute them as swindlers. Mr. McLean has deemed it wise to give publicity to the case in every way, in order that companies may be put on their guard, and we are indebted to him for the portraits of the two men presented herewith.

The case was presented to the Grand Jury, and that body has brought in indictments against both the principals and the woman who played the part of the victim of the accident. All three are in jail awaiting trial. It is probable that the charge against the woman will not be pressed, as she has confessed, and has agreed to appear as a witness against the other swindlers.

Strike at Carbondale Ended.

The strike of the conductors and motormen of the Carbondale (Pa.) Traction Company has been settled and all but two of the old employees have returned to work. Last week General Manager Aitken and Superintendent Duncan met a committee composed of the strikers and citizens of Carbondale. The dispute between the men and the company was talked over in an informal and friendly way and both sides to the controversy expressed themselves ready to make concessions. It was finally decided by the company to take back all the men with the exception of two, who had been instrumental in causing the strike. It was agreed to give them a fair hearing subsequently, and if the acts charged against them are not proved they will be allowed to return to their positions.

Some Practical Notes For Motormen.—I.

BY GEORGE T. HANCHETT.

Preliminary Ideas on the Electric Current.

The average street car motorman or conductor is conscious of the fact that something passes down from the trolley wire into his car, and through the motors into the track. That something he calls electricity or possibly "juice," as a more convenient appellation.

The object of this series is to set forth, as clearly as may be, some of the properties of electricity as applied to street railway cars, how it is controlled and how it operates the motors, together with a few practical hints as to the method of handling this peculiar form of energy when it becomes restive.

For the practical discussion, that the following aims to be, it is wise to consider electricity in a wire as very similar to water in a pipe. Such a comparison is called an analogy, and this analogy is an unusually beautiful and perfect one.

We may, therefore, consider the station dynamo as a powerful rotary pump, which pumps the electricity into the system of trolley wires only to be drawn therefrom by the cars and returned to the dynamo via the track, to be pumped over again.

Fig. 1 illustrates a hydraulic car which, though theoretically possible, is thoroughly impracticable. It is of use, however, in its exact likeness, as far as it goes, to the electric street car. Water is pumped by the centrifugal pump *A* into the trough *B*. Thence it is drawn by the siphon trolley *C* and delivered to the water motor *E* being controlled at the valve *V* by the handle *D*. Leaving *E* it flows into the trough *F*, only to be pumped back again into *B*.

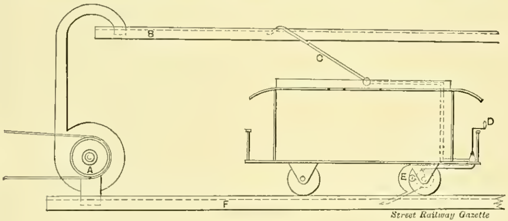


FIG. 1.

As there is usually more than one car drawing electricity from the line, it is fair to assume that the sum of all the amounts that the various cars are using, represents the total amount of electricity that the dynamo is pumping, provided our pipe does not leak, or, to use electric phraseology, our trolley system does not become grounded. These suppositions are perfectly correct from an electric as well as a hydraulic point of view, and this comparison will be frequently used. However, it is not wise to follow the comparison further than is indicated, for serious errors may be deduced as well as evident truths.

Turning to our hydraulic comparison, if we were to compute the power of flow of water we should need to know two things, first, the rate of flow, that is, the number of pounds per minute, and second, the number of feet that it was raised. This would give us, when we multiplied the two together, the foot-pounds per minute exerted, or, if we divided by 33,000, the horse-power. Notice that the number of feet that the water is raised is proportional to the *pressure* at which it is delivered, and in fact pressure is often so measured.

Now, similarly we may consider that we absorb from the trolley wire, when our car is running, a current of so many *coulombs per second* and that this current is supplied at an electrical pressure of a certain number of *volts*. From the analogy we should reason that if we multiplied the volts by the coulombs per second we should get the power. Not in foot-pounds this time, but watts, and if we divide this last result by 746 we shall get the horse-power delivered. But the actual mechanical height at which the electrical current is delivered makes no difference in the pressure necessary. It requires just as many volts to force a current of electricity up a vertical wire, as down it, and hence we see that we must not follow the comparison too far if we are to deduce correct results.

It then becomes important to know some of the special laws of electricity if we are thoroughly to understand the action of our motor. In order not to cause confusion, we shall now drop the station and line and consider the car alone.

First, at what pressure is our electricity supplied us, and if we open our valve or controller, as it is called, widest, what current will we get and why?

We will find it useful to turn to our hydraulic analogy once more. Consider our controller as a common globe valve, our motor as a water motor, our trolley as a supply pipe and the track as a waste pipe. If we could have such a water car, it is obvious that the car would deliver to the track as much water as it received from the supply pipe, the motive power being derived from the pressure of this water upon the blades of our motor. The water would have lost its pressure and would require to be pumped up into the supply pipe before it could be used again. Hence, there is a *drop of pressure* between our supply and waste pipes, and this drop is always the same, however much or little be the amount of water used. The amount of current flowing would depend upon the friction of the water in the pipes, the amount the globe valve was open and the resistance of the blades of the water motor to the flow.

Now, coming back to our electric car, it is supplied at 500 volts of electric pressure. When we open our controller and admit some current, it is resisted by friction, as we will call it, in the wires, by the amount the controller is open and by a peculiar back pressure in the wires of our motor, which we will consider later.

Unlike the frictional resistance of water in pipes, the frictional resistance of the wire is readily computed and measured, making the discussion of the internal action of the electric system much simpler than one of the hydraulic system would be. In fact, we may measure the resistance power in a certain definite unit. This unit is called the ohm. Thus, we might say that we had electricity at a pressure sufficient to force 20 coulombs per second through 25 ohms; or again, we might say we had such a large resistance that a pressure of 500 volts could only force 20 coulombs per second through it; or, we might be called upon to solve the problem as to what current we would get when we applied 500 volts to 25 ohms.

It is obvious that a simple rule connecting these quantities would be a great convenience. Also this coulombs per second is clumsy, though correct. Can we not use a simpler word? These two things have been done and it remains to state how. For the *coulombs per second* the word amperes has been substituted, and thus a current of two coulombs per second is a current of two amperes, which is much easier to say. The relation between current pressure and resistance, or if you please, volts, amperes and ohms is given in the three following laws, each of which may be derived from any of the others:

$$\text{Volts} = \text{amperes} \times \text{ohms.} \qquad \text{(I.)}$$

$$\text{Amperes} = \frac{\text{volts}}{\text{ohms}} \qquad \text{(II.)}$$

$$\text{Ohms} = \frac{\text{volts}}{\text{amperes}} \qquad \text{(III.)}$$

Thus, if in the future we encounter any problems where two of the three quantities are given, we may readily find the missing one by applying one of these three laws.

Let us now recapitulate our comparisons setting off our hydraulic laws, units and machines against their electrical equivalents.

	Electric.		Hydraulic.
Machines.	Dynamo		Pump.
	Motor		Water motor.
	Wire		Pipe.
	Controllers		Valve.
	Switch		Turn-off cock.
	Fuse.		Safety-valve.
Quantities.	Pressure		Head in feet.
	Current		Rate of flow.
	Resistance	Common to both	Frictional resistance.
	Power		Power.
Units.	Volt		Pound per inch.
	Ohm		No equivalent.
	Ampere		Pounds per minute.
	Coulomb		Pound.
	Watt	Common to both	Foot-pound per minute.
	Horse-power		Horse-power.
Rules.	Watts = volts × amperes		Ft.-pounds per min. = ft. × pounds per min.
	Power: horse-power = $\frac{\text{watts}}{746}$		horse-power = $\frac{\text{foot-pounds per min.}}{33{,}000}$
	Volts = ohms × amperes		Replaced by approximate rules in hydraulics which are somewhat similar.
	Ohms = $\frac{\text{volts}}{\text{amperes}}$		
	amperes = $\frac{\text{volts}}{\text{ohms}}$		

(To be continued.)

Street Railway Complaints.

Superintendent Scranton, of the Columbus Street Railway Company, recently made the following statement to a local reporter in relation to complaints on the line: "Complaints are made daily, but we insist that the complainant shall face those of whom they complain. We insist that our men shall at all times be courteous to our patrons, smothering their vexation at unreasonable people, and under no circumstances taking the law into their own hands. If the passenger becomes disorderly then the men are instructed to call upon the police to straighen out the trouble. This is very hard for a high-strung man to do, but we believe that we have as gentlemanly a set of men in our employ as any company anywhere. It is a remarkable fact, too, that the burden of the complaints come from people who should be more in sympathy with our employees. I mean those who live by labor themselves. They demand more than others and are not satisfied unless they get it. We have all sorts of people to contend with, but, on the whole, we feel that the sympathy between our employees and the public is strong, and forgives many things that spring up, accidentally, in nearly every case, that only the stickler finds fault with."

Street Railway Engineers.—VI.

A. N. CONNETT.

Mr. A. N. Connett, chief engineer of the Metropolitan Railway Company, of Washington, D. C., has been actively engaged in street railway work since 1888. He was graduated as civil engineer from the Rensselaer Polytechnic Institute, of Troy, N. Y., in 1880, and soon after was engaged, under Mr. L. E. Cooley, on the work of improvement of the Missouri River at St. Charles, Mo. For a considerable time he was connected with steam roads as resident engineer, with the Toledo, Cincinnati & St. Louis Railroad in Southern Illinois, and the Oregon Short Line of the Union Pacific, in Idaho. For several years he was engaged in general engineering work as assistant to William E. Northern in New York City. His first work in the street railway field was begun in March, 1888, when he entered the service of Knight & Bontecou, of Kansas City, as draughtsman for the Eighteenth Street cable line of the Metropolitan Railway Company and for the Holmes Street line of the Grand Avenue Railway Company of that city. He was afterward employed by the Bentley-Knight Company first in Allegheny City, Pa., and later, in Boston, Mass., where he assisted Mr. Walter H. Knight in constructing the electric railway conduits in Boylston Street. Upon the completion of this work he took charge of the conduit construction for the same company in Fulton Street, New York City. When it became evident from the Boston experiment that the conduit system was not likely to prove successful Mr. Connett determined to return to cable railway construction, and was appointed assistant to Daniel Bontecou on the Seventh Street line in Washington, D. C. He made the plans for the power station and took charge of the construction. After the work had been completed he was appointed assistant engineer of the Druid Hill Avenue line of the Baltimore Traction Company, and in this capacity he had charge of the construction of the roadbed. Upon the completion of the line, April 1, 1891, he was appointed division engineer of the Broadway cable line in New York, under Mr. George W. McNulty, but remained in this position only a few months, as on July 1 of that year he received the appointment of chief engineer of the Baltimore Passenger Railway Company. At that time this system, which was the oldest and most important in Baltimore, was operated entirely by horses. The business had suffered from the competition of the Druid Hill Avenue line of the Baltimore Traction Company, on which the cable had been introduced. It was not considered practicable to install the trolley system, as the prejudice against the introduction of overhead wires in such important thoroughfares as Madison Avenue and Gay and Baltimore Streets was too strong. The company, therefore, decided to cable its two most important lines, viz., the Madison Avenue and Baltimore and Gay Street divisions. The difficulties were many, as the traffic was heavy and the streets were narrow. The work, however, was accomplished in a manner that brought Mr. Connett into the front rank of cable railway engineers. Subsequently, the Charles Street line was included in the cable system. To furnish power for these lines, three stations were necessary, from one of which three cables were operated; from the second, two; and from the third, one. After the cable system, which included 20 miles of road, was in successful operation, the company decided to equip the remaining 23 miles of road under its control for electric traction. The responsibility of this work also devolved upon Mr. Connett. After the introduction of the cable system, Mr. Connett assumed the duties of general manager in charge of operation as well as those of chief engineer. When the equipment of all the lines for cable and electric traction had been completed, the responsibility for the most part was that of management, and as Mr. Connett's inclinations turned toward the engineering department, he accepted, in September last, the position of chief engineer of the Metropolitan Railway Company, of Washington, D. C., which he now holds. The problem presented for solution in Washington was both novel and attractive, as it involved the construction of an underground electric railway, a department in which, as it has already been mentioned, Mr. Connett had had experience. The conditions in Washington, however, were essentially different from those which were encountered in the early days of railway conduit construction. In the first place the success of the roads in Washington was not to be jeopardized by any restriction in regard to cost—an element of the utmost importance in an installation of this kind. The work was to be executed on a large scale and was to be prosecuted, not in any experimental way, but was to be planned so well and so carefully that the possibility of failure would be reduced to the minimum. The road was to be constructed, not in sections, which could be tested as the work progressed, but as an entirety. It was to be equipped throughout with the most modern appliances. Time was limited by an act of Congress compelling the company to put the Ninth Street line in operation by August, 1895, and the F Street line in operation a year later. The utmost expedition has, therefore, been exercised in designing and constructing the improvement. Many formidable difficulties have been encountered which it has required the most painstaking effort and nicest engineering skill to overcome, but all the obstacles it is believed have been surmounted. The installation is now progressing rapidly under Mr. Connett's supervision, and the Ninth Street line will be completed by the time fixed by the act. The work has been prosecuted on lines planned by Mr. Connett, and there is little reason to doubt that he will solve the difficult problem which he has attempted.

A. N. CONNETT.

Street Railway Gazette.

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ELECTRICITY ON ELEVATED ROADS.

The report that the Manhattan Company will equip its elevated system in New York with electricity has been in circulation at different times for a year or more. It has been repeatedly asserted that the change would be made, but it has been stated as often that no immediate change in motive power was contemplated by the company. Within the last few days the rumor has again been revived, and this time predictions of a change in motive power are made with even greater confidence. The report even goes so far as to state that negotiations for the sale of bonds to secure funds for the improvement are in progress. Whether this be true or not, we think there can be little doubt that the electric equipment of the system is only a question of time. The fact that the Metropolitan Company in Chicago is successfully operating its elevated system by electricity will tend to hasten the time when the New York company will discard steam locomotives.

AN INTELLIGENT JURY.

We are glad to note the fact that a Kansas City jury has refused to award damages to a man who was ejected from a car for offensive conduct. He persisted in the use of tobacco in a way that made him an objectionable passenger, and was deaf to the remonstrances of the conductor, who finally put him off the car. A suit naturally followed, and the disgruntled man asked for $1,900 damages to compensate him for the injury to his feelings. The jury, however, had too much common-sense to reward a man extravagantly because he had made a nuisance of himself in a public vehicle, and the complainant, we suppose, will have the privilege of paying the costs. This result is as satisfactory as the termination of the suit in Maine, to which we recently referred, where a passenger asked damage because he was not allowed to swear vociferously in a street car, but was ejected in consequence. The Supreme Court in that State, in a vigorous opinion, declared that the practice of using profane language was not one in which a street railway passenger could indulge to the annoyance of those riding in a car. Decisions of this kind are calculated to increase the efforts of companies to maintain order in their cars—a condition that is not always present, for the reason that conductors fear they may involve themselves in trouble if they engage too actively in the cause of decency. We hope to record like results in several cases of this kind now pending.

A QUESTION OF TRANSFER TICKETS.

Denver was recently treated to a mild sensation by reason of the fact that the Governor of Colorado narrowly escaped ejectment from a street car in that city. The cause of the threatened attack on the gubernatorial dignity was one that has very frequently led to trouble in the case of less distinguished street railway passengers. It was a question of the validity of a transfer ticket which had been issued to the chief officer of the commonwealth. After it had been presented to him the Governor did not take a car at the transfer station, but walked leisurely until one overtook him. When he then offered the slip it was refused, naturally enough, as the rule of the company provides that such tickets are good only when passengers board a car at the transfer point. The conductor did not know who his obstinate passenger was, and when the latter refused to pay his fare, made preparations to eject him. Governor Brown decided that discretion was the better part of valor, and handing the conductor a nickel under protest, ended the dispute. He promised, however, to make trouble because of the threatened indignity. He was convinced, he said, that the provision making the transfer ticket good only when presented at a certain point would not stand a test in court. We think the Governor is entirely mistaken in this conclusion. Transfers are granted as a privilege, and companies assuredly should be warranted, when issuing them, in establishing rules for their own protection.

HOSTILE TO STREET RAILWAYS.

We recently made a remark, which has been criticised in some quarters, that the officials in not a few cities seemed to regard street railway companies as public enemies which should be fought on all occasions and in every way, on the principle that all is fair in war. A pertinent illustration is to be found in Milwaukee, the hostile acts of whose authorities have led to a receivership for the street railway company in that city. This statement is made on the authority of Mr. Henry C. Payne, who has been at the head of the company and who is now one of the receivers. He is quoted as saying that the financial load under which the company was laboring might have been carried until the return of better times, when relief would have come in the natural order of events, had it not been for the unfriendly attitude of certain officials, and the attempt under the supposed form of law to inflict new burdens on the company by unwarranted taxation, and by restrictive and burdensome legislation. An attempt was made last spring, he states, to compel the company to pay an additional tax of $40,000 annually on account of a newly-discovered object of taxation which it was supposed the company possessed under the name of a franchise. This was a blow, Mr. Payne is quoted as saying, from which the company could not recover. It not only injured the credit of the company in financial circles, but created a feeling among capitalists in the East and abroad that their property was to be put at the mercy of assessors guided by no statutory rule and knowing no law but their own caprice and pleasure. This, together with the continual attempts of the City Council to harass the company and cut down its revenues, destroyed its credit and its ability to secure the additional capital necessary to sustain the enterprise. The foregoing explanation is made in practically Mr. Payne's own words, and as he is not the man to make careless statements, it may be accepted as unquestionably correct. The Milwaukee company was enterprising and ambitious, and was affording the city transportation facilities of which few places of its size can boast; and after a vast outlay of money for improvements, for new construction and for the organization of the several lines of the city into a complete system, the panic caused a material decrease in its revenues. The authorities then began to attack it on all sides, and the plans designed to decrease its income were executed with such success that the receivership became inevitable. We believe that attacks of this kind are calculated seriously to injure the progress of a city. Milwaukee possesses substantial advantages which should make it ultimately a great city, but when its representatives seek to destroy the property which capitalists are aiming to create, they are following a course little likely to promote its prosperity or future greatness.

Cost of the Brooklyn Strike.

A report has recently been made public showing the cost of the Brooklyn strike, to the executive board of District Assembly No. 75, which had charge of the strikers' interests. It appears that $13,737.69 was contributed. Of this amount over $4,000 was expended in paying for transportation for men who had gone to Brooklyn to work for the several companies but were induced to abandon their positions and return home. The sum of $9,210 was distributed among the needy members of the organization.

Court Regulation of Cars Asked For.

A curious suit has recently been instituted in Philadelphia by Christopher L. Flood, who asks the court to regulate the operation of the Electric Traction Company's cars on Passyunk Avenue. It is difficult to see how the court can remove the complainant's trouble without stopping the car service altogether. The plaintiff's children use the street for going on errands and "playing innocent games requisite and necessary for their enjoyment and the preservation of their health." How the operation of cars can be regulated so that children can play in safety on the tracks, it is not easy to understand. The plaintiff makes a wholesale complaint of the car service because the speed is too great and because fenders of a proper kind are not employed, and then alleges that "frequently the cars, in running, wobble from side to side of the tracks, and with the frequent ringing of bells, make so much noise as in the judgment of your orator constitutes them a nuisance, especially at night when it is impossible at times for persons residing on Passyunk Avenue to sleep, because of the noise." The court is asked to abate the nuisance, but how this is to be done is not suggested in the complaint.

New York Rapid Transit.

At the annual meeting of the New York Rapid Transit Commission last Tuesday, statements were made to the effect that the board will soon begin active work on the preliminaries for the underground road. Within three weeks it hopes to secure enough consents or refusals of property owners so that application to the court may be made to secure the necessary rights. An application was received by the board for a franchise from a company which desires to locate pneumatic tubes in the tunnel. The chief engineer was instructed to confer with the commissioner of public works and with the officers of several companies having pipes and wires under ground and to report concerning the provision which must be made for them along the rapid transit routes. The chief engineer was also requested to report his conclusions as to what were the most desirable locations for stations and as to the best method of equipping and operating the road.

Need of Electric Railways in Japan.

A correspondent in the Washington *Star* recently referred to the need of electric railways in Japan. Tokyo, he writes, has now more than 1,000,000 people, and the probability is that it contains more than a million and a half. It is only 14 miles from Yokohama, through a thickly settled country, and an electric railway built between the two points would undoubtedly pay.

At present there are no electric railways in Tokyo, and there are no street car lines in Yokohama. The field for electric railways is practically uncultivated, and by the new treaty it would be possible for Americans to engage in such work outside of the treaty ports. Take the town of Osaka, in the central part of the empire. It has, with its suburbs, 1,200,000 people, and there is not an electric railway in it. It lies sixteen miles back from the sea coast, and it is connected by railway with the town of Kobe. Kobe was very small at the time that Japan was opened, but by the census of 1890 it contained 136,000 people. An electric railway between Kobe and Osaka ought to pay. This part of Japan is one succession of villages, and only a few miles west of Osaka is the great city of Kioto, which was for years the capital of Japan, and which is now as big as Washington or Cleveland. If an electric line were stretched from Kobe to Osaka and thence on to Kioto, it would strike villages at almost every mile of travel, and it would accommodate a population of fully 2,000,000 people. The Japanese are great travelers. They make long excursions over the country to visit the most sacred temples and shrines, and hundreds of families are met walking along the roads from one sacred point to another. The railway cars were well filled, and these electric roads would pick up many parties out on these trips of religion and pleasure combined. As to the electric light field, that is also great.

Double-Decked Cars.

The St. Louis *Globe-Democrat* recently interviewed several street railway managers in reference to the use of double-decked cars. One official, when asked why these cars were not operated, stated that his company now had troubles enough on hand without trying to find new ones. "One St. Louis line," he said, "had a few of them years ago. They are popular in Paris, but would not be in St. Louis for the simple reason that our cars climb too many hills, turn too sharp and short corners, and, above all, run too fast. Speedy cars must not be top-heavy, which is just exactly the case with the double-deckers. Besides being a constant source of annoyance, they also invite accidents. At least that is my opinion, from the construction of the car. Then there is too much work for one conductor and not enough for two."

Winthrop Bartlett, civil and electrical engineer, and connected with the St. Louis & Suburban Railway Company, readily gave his experience with the double-deckers. "The St. Louis Cable & Western Railway," he said, "tried that kind of cars and soon tired of them. In 1888 an order for 14 cars was given, and a few weeks after their arrival the officials were convinced that they would not prove a success. On the contrary, they were a nuisance, as every drunken man or hoodlum who boarded the car wanted to go 'upstairs,' as they called it. One conductor had charge of both decks, and many threw up their jobs in consequence. I am firmly convinced that the old cable company lost many nickels each day through neglect on the part of the conductor or the shrewdness of the passengers. The cars were run two seasons, then the officials of the company decided that they were not suitable for the line and they were turned into the sheds. Later on, the upper deck was removed and the car fixed up as an every-day car."

Violating Speed Ordinance.

Four Brooklyn motormen were fined $50 each last week for violating the new city ordinance, limiting the speed of trolley cars. Three of the men pleaded guilty and the fourth was convicted by the jury. In pronouncing sentence, the Court gave a general warning to motormen, stating that hereafter penalties for violation of the ordinance would be much more severe. The ordinance limits the speed to six miles per hour in the downtown portions of the city and to eight miles per hour in the outlying districts.

Comments and Views of Contemporaries.

ELECTRICITY ON STEAM ROADS.—Once let the steam roads commence to use electricity as a motive power and the street railways will certainly be put on the defensive in the matter of competition, and much of the recent heavy investment in these properties, induced by their remarkable popularity, will certainly be rendered profitless.—*Boston Traveler*.

AT THE EXPENSE OF THE PEOPLE.—One of the last officials acts of Speaker Fish was the appointment of three roving committees. A committee of seven, headed by Nixon, of Chautauqua, is to harass street railway companies during the summer months whenever five Republicans feel an aching void for New York hotels at State expense.—*Buffalo Times*.

USELESS FENDERS.--The fenders on the trolley lines will be absolutely useless as long as they are held by a chain at an elevation of several inches above the ground. The fender to be effective must be very close to the rails, so that it can pick up any object lying directly before it. As long as the fender is kept high above the rails, it will be worse than useless and will give no protection whatever. —*Newark Advertiser*.

DECREASING NUMBER OF ACCIDENTS.--A remarkable feature of the electric system is that, in this city at least, the number of accidents upon its lines is much smaller, annually, than the number that occurred on the street railways before the introduction of electricity. We do not undertake to explain why this is so. It may be that people are more careful than they were when the street cars were operated with horses, or that the motorman is more attentive to his duties than the sleepy mule driver was.—*Savannah News*.

NEW USE FOR STREET CARS.—Street cars sent by American manufacturers to Cuba, when opened up, are found to contain arms and ammunition for the insurgents. This, however, is an incidental and accidental development of the American street car. If the revolution really intends revoluting, it should establish trolley lines all over the ever faithful isle and kill its enemies off, one by one, by running over them and dropping live wires into their midst.—*St. Louis Star Sayings*.

FENDERS A FORLORN HOPE.—The aim, however, should be to avoid the need of depending on fenders, for the construction of cars is such as to make them dangerous to any one who may be struck, even though he should escape the wheels. Fenders of some kind should be provided as a kind of forlorn hope, but reliance should be placed chiefly on the running of the cars at a uniform and moderate rate of speed, not exceeding seven or eight miles an hour at any time in the crowded parts of the city. That will not be "rapid transit," but no one had any right to expect to get rapid transit on surface railways.—*Philadelphia Public Ledger.*

UNPOPULAR EXTREMES.—Extremes are never popular. In the outset the trolley car managers ran their cars entirely too fast; and frightful accidents were the inevitable result. Then the Board of Aldermen passed ordinances restricting speed to six miles an hour. This was rushing to the other extreme. Indignation was aroused by the many accidents when cars were rushing through the streets at 20 miles an hour; and it is also aroused at the slow time which is now being made—both fully justified. A middle course is what is needed. This, with carefully selected motormen, and thorough supervision, by the trolley managers, will solve the whole problem.—*Brooklyn Standard-Union.*

FAIR DEALING AND GOOD SERVICE.—Legislative trickery, overcrowded cars and neglect of minor yet important details of operation invite hostility. People are slow to resent imposition, but when aroused they have it in their power to make the situation uncomfortable for transportation concerns. Railway companies which try to please their patrons seldom have collisions with the authorities. The Old Colony, for exapmle, enjoyed exceptional popularity, because it consulted the wishes of the people it served and never went to legislative bodies with bills that honest men would not vote for if they understood the real intent of the measures. More than one street railway company will find it profitable to adopt Mr. Kendrick's methods. The history of the Old Colony shows that square dealing and good service command both popularity and dividends.—*Providence Journal.*

SPRINKLING STREETS.—Recently the City Council adopted an ordinance requiring the street railway companies to sprinkle their tracks. Every citizen who travels in the electric cars will rejoice at this. The one drawback, and it is a most serious one, to rapid transit is the unendurable dust that is stirred up by the swift motion of the cars, and pervades those vehicles on pretty nearly every street. It is not likely that the railways will submit to the duty required of them in this ordinance without a fight; but, at any rate, all the questions at issue will be judicially decided, and the people may gain some benefit in the end. There is no question of the right of the Council to make regulations for the preservation and promotion of the public health, and the dangerous and poisonous nature of the dust of the streets is too well known to need demonstration.—*New Orleans Picayune.*

BLOCKADING STREET CARS.—Several citizens of Boston have asked the *Herald* to call the attention of the teamsters of the city to the serious injury they often do the traveling public in obstructing the movements of the street cars. This is seen particularly where teams are placed across the car tracks in loading or unloading goods at store doors. When this work is engaged in leisurely it often compels the loss of valuable time to street car passengers, and every day is the means of more or less people losing trains of steam cars which they are aiming to take to leave the city. Those who have addressed us on this point think it should receive the attention of the press. The delay is often caused by thoughtlessness, and were those who are the agents in it aware of the extent of the inconvenience they cause, many of them would probably be induced to quicken their movements. Working people suffer largely from this cause.—*Boston Herald.*

TO PREVENT ACCIDENTS.—There are two plain duties to be recognized for the common safety of people in streets occupied by trolley cars. The cars are indispensable and the increased speed attained by the trolley is a public necessity. Accidents must happen by all methods of transportation, and especially where they occupy the public streets of cities, and the injury to persons will be reduced to the minimum whenever the two parties most in interest shall each perform its duty. The first duty is that of the trolley managers to equip their cars in the best possible method that can be devised for the protection of life and limb. However costly it may be, it would be practical economy, and in addition it is a duty that the trolley companies owe to the public. The other duty belongs to the citizens of Philadelphia. They must learn that the public highways are not playgrounds for children; that they are for the use of vehicles, and that they are unsafe to be occupied by either men, women or children. A majority of the serious accidents resulting from our trolley cars have been among children who go upon the streets and use them as playgrounds.—*Philadelphia Times.*

ACCIDENTS IN BROOKLYN.—Trolley lines have no more desire to deplete their treasuries paying for accidents than are other corporations. It seems that the larger part of the injuries were inflicted upon children in the districts where such a thing as a crowded street is never known. It is reasonable, therefore, to suppose that the parents of Brooklyn are not using proper caution in keeping their children out of the streets, where they do the most of their playing. This may sound cold-blooded, but it is true, as every citizen riding on the trolley cars can testify. The franchise was originally granted to the surface roads to construct their trolley lines in order that faster time might be made, but, under the present arrangements, the old horse cars were preferable in point of speed and time. A city the size of Brooklyn should not take any backward steps in these days of progression, but should rather foster and aid in such schemes as will increase the wealth of the city in its every limit, and not restrict its growth to certain localities.—*New York Tribune.*

QUALIFICATIONS OF MOTORMEN.—In half a day a bright and capable man, possessed of a fair degree of judgment, should be able to take his place upon the front platform and do as well as his more experienced fellows In three days a dull man, possessed of some judgment, should reach the same efficiency. On the other hand, a man without judgment, no matter what his abilities might be, should never be put into a position of such responsibility. But the motorman is not a skilled workman. He is not an engineer. The art of the trade of engineering requires years of training to properly learn it, demanding a great deal of mechanical and technical knowledge and placing a great burden of responsibility upon the engineer. His work is to generate a tremendous power and then to control it. The motorman's work is only, by the use of the simplest mechanical device, to regulate a measured amount of power. To assume or require unnecessary tests of motormen, beside, would be unfair to the railway companies. It would make them helpless in all controversies with their employees. It would be as unreasonable as unjust.—*Minneapolis Times.*

Metropolitan Elevated Railway.

In the Street Railway Gazette appeared a description of the power station and general system of the Metropolitan Electric Elevated Railway in Chicago. In the accompanying illustrations are shown some of the characteristic features of the line. As in the intramural railway at the World's Fair, the working conductor is a lateral third rail, to which current is conducted by heavy feeder cables. The rail is fastened to heavy timber beams outside the guard timbers of the regular track, Figs. 1 and 4, the top of the rail is elevated somewhat above that of the service rails, which are used for the return and are carefully bonded by two copper strips, one on each side, of extra large cross-section, riveted cold through the holes in the web.

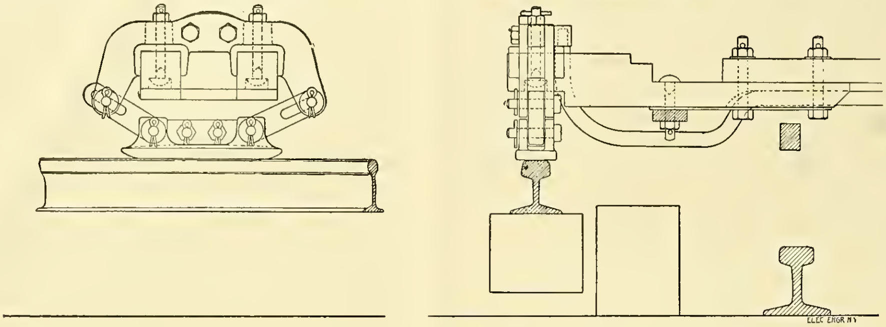


FIG. 1.

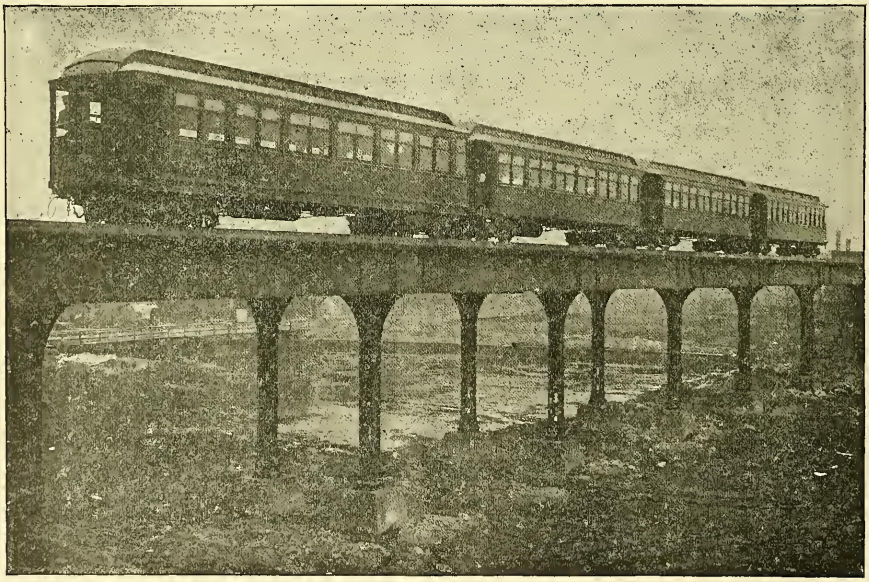


FIG. 2.

The first car in each train is a motor car and will be used as a smoker. The motors, Fig. 3, are known as G. E. 2,000, a title explained by the power of the motor, which is rated as 2,000 pounds horizontal draw-bar pull through a 33-inch wheel at twenty miles an hour. The rated capacity in horse-power is 100 hp under normal conditions and 150 hp for short intervals. The maximum speed is rated at between 35 and 40 miles an hour on straight and level track.

These motors are of the single reduction type, thirty-three inches high and fifty inches wide over gears. The field frame is of steel and the armature is of the iron-clad type, with series drum single turn barrel winding. These windings are set in slots in the surface of the core. The motor is thus rendered mechanically staunch and easy of repair.

It is entirely enclosed and is dust and water-proof. Two doors at the commutator end allow of access to the interior, and the motor can be readily inspected either from above or below.

Two of these motors are mounted upon one of the two trucks of the motor cars—one to each axle. Each car is equipped with two-series parallel controllers, especially designed for this work, and two electric air compressors for the air brakes. The motors are protected by an automatic main switch, which is, in this case, a "K" automatic circuit breaker. In the operation of the controller, when a quick start is desired, the handle is brought round one-half a turn to the right, thus bringing the motors into multiple at full speed. If the start is to be the ordinary gradual acceleration, the handle is moved half a turn to the left, and the motors brought up to half speed; another turn in the same direction throws them in multiple and they move forward at full speed. The arrangement is such that each motor takes an equal portion of the load, one of the most important factors in traction work.

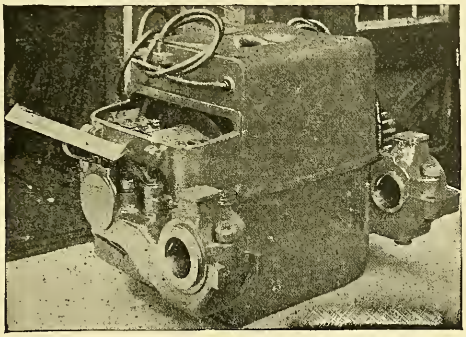


FIG. 3

The reversing switch, which is arranged at the side of the controller and is capable of movement from and toward the motorman, is equipped with a safety interlocking device. This operates to render the reversal of the motors impossible should the controller handle not be in the right position. As in the "K" type, this controller is equipped throughout with the G. E. magnetic blow-out, by which possible destructive arcing is effectually prevented.

Current is taken from the third rail by a contact shoe, Fig. 1, which hangs from an oaken beam projecting from the side of the truck. The shoe is suspended by means of links, which allow of its accommodating itself to any unevenness of the rail or track. Each motor truck is equipped with two of these, one on either side. Going north the right shoe is in contact, going south the left shoe. The road has no loops at the terminals.

Each motor car is provided with two motorman's compartments, built out upon the platforms, set diagonally at each end. Each compartment contains its own controller and pump.

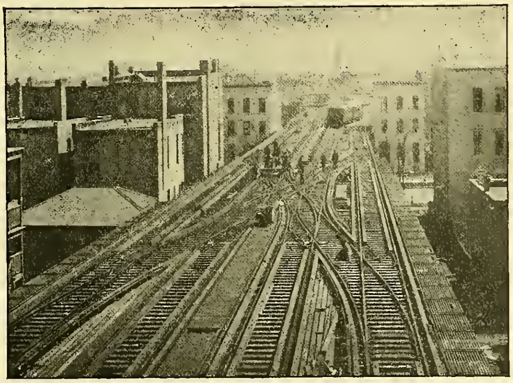


FIG. 4.

The trains, Fig. 2, will consist at first of one motor car, fitted up as a smoking car, and three trailers. Each motor car, fully loaded and equipped, will weigh 63,500 pounds; each trailer car, loaded, 46,000 pounds. With the two motor cars and three trailers the average speed will be thirteen miles an hour, measured on the tangents of the Garfield Park line, including stops of fifteen seconds each at stations approximately 2,000 feet apart. The present plans contemplate the adoption eventually of six-car trains made up of one motor car, equipped with four G. E. 2,000 motors, and five trailers. The average speed of these trains on the Garfield Park tangents will be fifteen miles an hour, including similar stops.

The Brownley Double-Tube Valveless Injector.

The Brownley double tube valveless injector which is shown in Figs. 1 and 2 may be operated, the manufacturers claim, at pressures from 15 pounds up to 350 pounds, and from 350 pounds down to six pounds. It works without regulation or breaking its flow and raises and feeds water on a three-foot lift at temperatures as high as 156 degrees and on a 22-foot lift up to 130 degrees. The injector is a simple device. The steam inlet is one size smaller than the suction, the delivery, therefore, being very economical, so far as steam is concerned. When steam is given to start the injector the water will immediately appear at the overflow; the cock is turned by means of a lever and the water will then be fed to the boiler. No variation of steam pressure, it is claimed, from 350 pounds down to six pounds, will cause loss of water at the overflow.

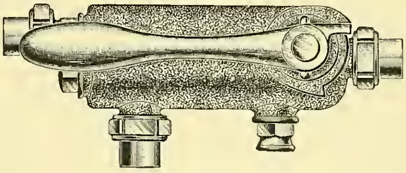


FIG. 1.

It is stated that the general foreman of the Manhattan Railway, of New York, made tests of the Brownley injector and one of another make, with the result, it is claimed, that the Brownley type fed about 33 per cent. more water in a given time and did it continuously. He also states that one of its important features is its simplicity. There are no valves to grind, and an ordinary mechanic can take the injector apart and put it together again in five minutes.

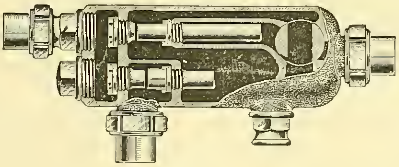


FIG. 2

The tendency of the time is toward higher steam pressures, and the manufacturers of the Brownley injector claim it is the only device of the kind which has been made to feed up to 350 pounds. It feeds as easily at that point, it is claimed, as at a lower pressure. At the tests, water in the tank was heated to 100 degrees by blowing steam down the suction pipe and the injector lifted and fed it through the hot injector pipes. The general agent for the sale of the injector in the East is E. F. Keating, 453 Water Street, New York.

FINANCIAL NOTES.

LONG ISLAND TRACTION COMPANY.—Daniel F. Lewis, president of the Long Island Traction Company, has denied the rumor that he proposes to resign his position.

TACOMA RAILWAY SOLD.—The Point Defiance Street Railway Company of Tacoma, Washington has been sold for $163,000 to a syndicate composed of eastern and Portland, Ore., capitalists. The company controls seven miles of street railway.

REPORT OF THE MONTREAL STREET RAILWAY.—The Montreal Street Railway statement for April is favorable. Operating expenses decreased $1,776, as compared with April, 1894, and gross earnings increased $13,898. The increase in net earnings was $15,674.

ATLANTA TRACTION COMPANY.—The property of the Atlanta Traction Company has been sold to a Baltimore syndicate, composed of the bondholders represented by W. Checkley Shaw and Richard D. Fisher. The price paid was $150,000. A reorganization of the company will follow.

SALE OF THE WADDELL-ENTZ ASSETS.—The plant and stock of the Waddell-Entz Electric Company, of Bridgeport, Conn., were sold by order of the court last week to Percival Knauth, for $60,000. The property disposed of consisted of patents, machinery, stock and several storage battery car equipments.

TROY CITY RAILWAY COMPANY'S REPORT.—The following figures are taken from the report of the Troy City Railway Company for the first quarter of the year: Gross earnings from operation, 1895, $98,063.87: 1894, $86,381.21; operating expenses, including taxes, 1895, $56,855.51; 1894, $49,166.80; net income, 1895, $12,939.43; 1894, $11,260.90.

SALE OF THE BAXTER ELECTRIC MOTOR COMPANY'S WORKS.—The works and property of the Baxter Electric Motor Company, of Baltimore, were sold last week at auction to Jesse N. Hilles, secretary of the company, for $25,000. The company has been in liquidation for a considerable time, and the sale was made in accordance with an order of the court. It is understood that the business will be continued.

RECEIVER APPOINTED.—Ernest Hall has been appointed temporary receiver for the firm of J. C. Thompson & Co., of New York, which was formed in 1892, to build and equip the Port Richmond & Prohibition Park Electric Railway on Staten Island. The suit for the appointment of the receiver was commenced by Royal C. Vilas, one of the firm. It is stated that the partners have disagreed regarding the terms of dissolution and the division of assets.

REPORT OF THE ROCHESTER RAILWAY COMPANY.—The report of the Rochester Railway Company, of Rochester, N. Y., for the quarter ending March 31, 1895, shows: Gross earnings from operation, $187,100.26; operating expenses, $128,014.15 net earnings from operation, $59,086.11; income from other sources, $7,080.99; gross income from all sources, $66,167.10. The report for the corresponding quarter of last year showed: Gross earnings from operation, $174,375.87; operating expenses, $107,436.35; net earnings from operation, $66,939.52; income from other sources, $1,438.50; gross income from all sources, $68,378.02.

REORGANIZATION OF THE BRAINTREE STREET RAILWAY COMPANY.—The Braintree Street Railway Company has been reorganized with the following new directors: Joel F. Shepard, M. Branley, Braintree; George A. Beatty John Beatty, Hyde Park; W. O. Chapman, Charles H. French, Canton; George D Moore, Worcester. Joel F. Shepard has been elected president and George A. Beatty treasurer. The directors have purchased the $10,000 stock held by the American Railway Improvement Company, and this, with the Beatty holdings, gives the board control of 272 shares out of 350 issued. The company is now in good financial condition, and the franchises of the Randolph & Braintree extension have been accepted, and the road will be extended. The company has contracted to furnish the Braintree & Weymouth road with power. Reports that the roads have consolidated are said to be incorrect.

TO PREVENT CONSOLIDATION.—A suit has been begun by John Turnbull, of Chicago, a stockholder in the Kansas City Metropolitan Street Railway Company, for an injunction to prevent the consolidation of the Kansas City street railways. The petition recites that the consolidation is illegal because of its conflict with the constitution of the State prohibiting the consolidation of parallel and competing lines. It is the intention of those having the consolidation in charge that the new management shall take charge at once. Colonel C. F. Morse will be the president, and Walton H. Holmes general manager. The scheme of consolidation is for the Metropolitan to increase its capital stock from $3,500,000 to $8,500,000, and acquire the stock of the Grand Avenue Railway, the Kansas City Cable Railway, and the Kansas City and Independence Rapid Transit. Its bonds will be increased to $8,500,000, and the bondholders of the three companies will take Metropolitan bonds instead of what they now hold. The consolidated companies operate 128½ miles of street and elevated tracks.

PLANS FOR FINANCING THE NORTHWESTERN ELEVATED.—A meeting of the stockholders of the Columbia Construction Company, of Chicago, is to be held June 13, "to consider the question of underwriting the securities of the Northwestern Elevated Railway Company necessary to complete the entire road, and such other matters pertaining thereto as may come before the meeting." This means that the lines are now formulated upon which the financiering of the Chicago Northwestern Elevated enterprise is to be carried through. The Northwestern Elevated Railway Company, of Chicago, was organized with an authorized capital stock of $15,000,000, and a mortgage was created authorizing the bond issue of $15,000,000. The Columbia Construction Company was organized to build the road. The construction company had a capital of $2,000,000, and all of that was subscribed for and paid in full, in cash. A short time ago stockholders of the construction company were offered the opportunity to subscribe to $2,000,000 of the Northwestern Elevated bonds at 90, with a bonus of 10 per cent. of the stock of the elevated company. A plan will now be brought forward and presented to the stockholders at the meeting June 13, which will cover the financing of the entire Northwestern enterprise.

WEST END STREET RAILWAY COMPANY OF BOSTON.—The Boston News Bureau says of the West End Street Railway Company: "While the West End Street Railway Company in common with the Lynn & Boston and other street railways of New England, has been finding a lower level for cost of operation both as respects equipment, repair and the transmutation of heat units of coal into electric traction units, there is one account which seems to be as yet unadjusted in West End figures and that is the track repair account. This has been the troublesome account for some years, and the economical adjustment of balance between the weight of rails and the weight of cars seems not yet to have been finally determined. It is in the rail and roadbed repair account that the most suspicion of conservative investors has been cast regarding the handsome exhibits the West End has at times been making. The track repairs this month and last month are understood to be the heaviest the West End has ever encountered. At present, in many places, the company is relocating rail joints so that they will have new bearings on the ties, etc., and in other places, such as Washington Street, between Dover and Northampton, the old double track has been entirely replaced by nine-inch girder rails, laid on heavy cross ties, and joined every few feet with iron rods."

NEW INCORPORATIONS.

PEORIA, ILL.—The Richwoods Street Railway Company has been incorporated with a capital stock of $50,000. The promoters are Robt. M. Cox, Jas M. Morse, and Theodore J. Miller.

MONTAGUE, MASS.—The Montague Street Railway Company has been incorporated. The capital stock is $40,000. The promoters are H. L. Pierce, Leominster, Mass.; Frank E. Low, Greenfield, Mass., C. E. Dresser, Leominster, Mass.

FALL RIVER, MASS.—The Fall River & Providence Street Railway Company has been incorporated with a capital stock of $250,000. The promoters are Frank S. Stevens, Robt. T. Davis, Geo. W. Slade, Frank W. Brightman, Wm. F. Thomas, Benj Cook, and Chas. F. Shaw.

NEW YORK, N. Y.—The Delta Construction Company, of New York, has been incorporated with a capital stock of $18 000 to construct railways, wharves, elevators, warehouses, etc. The promoters are J. L. Nisbet, Yonkers, N. Y.; Edson Pearsall, Brooklyn, N. Y.; A. M. Poole, New York, N. Y.

THE BROCKTON & NORTH EASTON STREET RAILWAY COMPANY has been incorporated with a capital stock of $50,000. The incorporators are John P. Morse, Judge Warren, A. Reed, Horace B. Rogers, of Brockton, G. H. Campbell, of Lawrence, and Edwin S. Webster and Alfred A. Glasier, of Boston.

NEWS OF THE WEEK.

PLATTSBURGH, N. Y.—A proposition has been made to the people to build and equip a trolley road from Kanona to Plattsburgh.

NIAGARA FALLS, ONT.—The street railway from Niagara Falls, Ont., to Niagara Falls, So. Ont., is to be equipped for electric traction.

BOSTON, MASS.—The House last week passed a bill requiring the West End Street Railway Company, of Boston, to issue free transfer tickets.

BROOKLYN, N. Y.—Henry R. Newkirk has petitioned the town of North Hempstead for a franchise to construct an electric railway in the town.

PITTSFORD, VT.—An electric road from Pittsford to Rutland by way of Proctor is talked of.

DUBLIN, PA.—At a cost of $128,000, the trolley line will be built from Dublin to Souderton, a distance of eight miles.

DEFIANCE, O.—A power house of the Defiance Lake Railway Company was partially burned recently; loss $7,000; fully insured.

EVANSBURG, PA.—F. A. Shoemaker, of Evansburg, is interested in the promotion of an electric railway from Johnstown to Evansburg.

ALLENTOWN, PA.—Lahr, Leh & Martz, surveyors for the Allentown & Reading Trolley Railway, have received orders to complete the survey

PENN'S GROVE, N. J.—It is reported that work will soon be commenced on a trolley line from Penn's Grove to Salem. A charter has been secured.

WESTPORT, CONN.—The board of directors of the Westport & Saugatuck Horse Railway Company has voted to substitute electricity for horses on the line.

CHATTANOOGA TENN.—The Rossville Chickamauga Electric Street Railway Company has appointed a committee to ask for bids for the construction of its roads.

DETROIT, MICH.—The Detroit Railway Company has completed 10 miles of track. It is expected that the line to Belle Isle will be finished within three weeks.

BROOKLYN, N. Y.—Last Monday the chief trolley line inspector reported 37 violations of the ordinance regulating speed, which occurred on Saturday and Sunday.

ATLANTIC CITY, N. J.—It is proposed to construct a trolley line from Atlantic City to Camden. James Scott, of Chester, Pa., can probably give information.

ORLANDO, FLA.—E. W. Henck has commenced surveying with a corps of engineers for his electric railway to parallel the South Florida Railway to Orlando.

NEWARK, N. J.—The Passaic & Newark Electric Railway Company has broken ground, and work will shortly commence on the construction of its road at Franklin.

SKOWHEGAN, ME.—It is reported that the managers of the Skowhegan & Norridgewock Electric Railway have voted to expend $5,000 in improvements on their road.

PITTSFIELD, MASS.—The Pittsfield Street Railway Company has petitioned the city authorities for permission to extend its tracks through Orchard and other streets.

OSHKOSH, WIS.—The Central Wisconsin Electric Company has commenced work on the electric railway which will unite Oshkosh, Kaukauna, Appleton, Neenah and Menasha.

SCRANTON, PA.—An ordinance has been adopted restricting the speed of electric cars to six miles an hour in the central part of the city, and 10 miles in the outlying districts.

WATERLOO, N. Y.—The Village Board of Trustees has granted the right of way to Main Street, connecting the Geneva & Waterloo Railway, with the road running to Seneca Falls.

WATERLOO, N. Y.—The Corporation Board of Waterloo has granted a franchise to the Geneva, Waterloo, Seneca Falls & Cayuga Lake Railway Company to extend its line to Waterloo.

PERTH AMBOY, N. J.—Edward Radell, secretary of the new trolley company that is to encircle Middlesex County, is at work upon plans for the road. Gottfried Cruger is also interested.

BOSTON, MASS.—It is announced that the Nantasket Beach line of the New York, New Haven & Hartford Railway Company will be operated by electricity some time during the month of June.

MONTREAL, QUE.—Duncan Macdonald, superintendent of the Montreal Street Railway Company, recently caused the arrest of two teamsters who maliciously blocked the cars on one of the lines.

EAST BRIDGEWATER, MASS.—The Selectmen of East Bridgewater will grant a franchise to the Brockton and East Bridgewater companies for the construction of an electric railway through the town.

KANSAS CITY, KAN.—The car house and machine shop of the West Side Street Railway Company, Third and Oakland Avenues, recently damaged by fire to the extent of $25,000, will be rebuilt on the same site.

FRANKFORT, N. Y.—Clinton Beckwith, of Herkimer, is at the head of an enterprise to construct an electric railway from Frankfort to Utica. He announces that the road will be built beyond all question.

NEWARK, N. J.—A gang of laborers employed by the Consolidated Traction Company struck for higher wages last week. Other men were found to take their places, and were put to work under police protection.

PORT HURON, MICH.—Mayor Boynton and other Port Huron capitalists propose to build an electric railway from Port Huron to Algonac along the river, thence to Chesterfield, so as to connect with the Grand Trunk road.

NEW YORK, N. Y.—It is announced that the officials of the New York & Putnam Railway Company, which is a branch of the New York Central, will adopt electric motive power on the line from 155th Street to Yonkers.

PITTSBURGH, PA.—The McKeesport, Duquesne & Wilmerding Railway Company have awarded to George T. Rehn & Co. the contract for the construction of the extension of its Wilmerding line to connect with the Versailles railway.

INDIANAPOLIS, IND.—The superintendent of the police has ordered the street railway company to remove an advertising car which has been operated on the line. Complaints were made that horses were frightened by the appearance of the car.

NEW ORLEANS, LA.—Second Assistant Postmaster-General Neilson has telegraphed that the plan for using the electric railway lines for the distribution of local mail will be carried into effect as soon as the necessary arrangements can be made.

BROOKLYN, N. Y.—A committee of employees of the Atlantic Avenue Railway Company recently presented a petition to the management, asking that there be no further reduction in the number of regular cars or an increase in the number of trippers.

WYOMING, PA.—The project to build an electric branch at Mt. Lookout, back of Wyoming, is again being revived. John Graham, of the Traction Company, Builder Phil. Rafe, Chris Stemeyer and John A. Hutchins, Wilkesbarre, are interested.

BRIDGEPORT, CONN.—President Radel, of the Bridgeport Traction Company, has offered to give a bond for $20,000 as a guarantee that if the company is allowed to use macadam pavement on Clinton Avenue, and it proves unsatisfactory, it will be repaved with Belgian blocks.

NEWBURGH, N. Y.—Surveyors have been making preliminary surveys of the towns of Newburgh, Marlboro and Lloyd, for the purpose of establishing a trolley route to connect the Walden extension of the Newburgh & Walden Electric Railway with the Poughkeepsie bridge.

FAIR HAVEN, CONN.—The Fairhaven & Westville road has purchased the charter of the New Haven & North Haven Electric Street Railway Company, with the right to run out Davenport Avenue to Mt. Montowese, about two miles, and the construction will be commenced at once.

LACHINE, QUE.—The Lachine council has passed an ordinance authorizing Mr. Bickerdike to construct an electric railway on St. Joseph Street. Three miles of road are to be constructed during the summer, and power will be supplied from the power house at Cote, St. Paul, five miles distant.

RUMFORD FALLS, ME.—At a meeting of the Rumford Falls & Rangeley Lake Railway directors, held in Portland, May 11, it was voted to extend the road to Rangeley Lake this summer. The directors are desirous of receiving bids for the same, which will be opened June 10. Waldo Pettingell is resident engineer.

TROY, N. Y.—A meeting was recently held in Troy which assures at least an electric road from Albia to Averill Park, and is said to be the beginning of the Troy & New England railway line, as it is upon the charter of that company that the road begins. President, George T. Lane; vice-president, Wm. A. Thompson.

WORCESTER, MASS.—The Mystic Valley Street Railway Company has been incorporated by Abraham B. Coffin, Onslow Gilmore, Stoneham; Edwin K. Blaikie, Stephen H. Langley, George S. Littlefield, Winchester. The company proposes to construct an electric railway connecting Stoneham, Winchester and Arlington. The enterprise will involve an outlay of between $80,000 and $100,000.

BROCKTON, MASS.—Another electric railway in all probabilities will soon be built. The name of the corporation will be the Brockton & Northeastern Street Railway Company, and the line will be practically an extension of the present one. John P. Morse, Judge B. Reed, and Horace B. Rogers, of Brockton, are interested.

NAPA, CAL.—L. Crothwell, of San Francisco, has asked the county supervisors for a franchise for an electric railway from Napa to Calistoga, a distance of 27 miles. He stated that he represented a syndicate having abundant means to build the railway, which it is estimated will cost $400,000. If built, the line will parallel the Southern Pacific Company's line.

CHICAGO, ILL.—Judge Payne has denied the motion made to dismiss the petition of the Metropolitan "L" to condemn a small piece of property near North and California Avenues, owned by the Lake Street elevated road. If the land is condemned by the Metropolitan Company, then the Lake Street road must cross its lines, which will be a matter of great expense.

MONTREAL, CAN.—At a Harbor Board meeting a letter was read from C. F. Gildersleeve, general manager of the R. & O. Navigation Company, stating that a bill to incorporate the South Shore Railway Company would come up before the Private Bills Committee at Ottawa. The bill provides for a railway and general traffic bridge across the St. Lawrence to St. Helen's Island.

PORT HOPE, ONT.—P. R. Randall addressed the counsel of the Corporation of Hope, at a regular meeting held at Port Hope, respecting the advisability of submitting notice of motion of introduction of a by-law at next meeting, for the purpose of granting an electric company the right to build a trolley track on the portion of the Rice Lake Gravel Road, situated within the limits of the township of Hope

WILMINGTON, DEL.—At a meeting of the incorporators of the Wilmington & Chester Railway Company last week, it was stated that the survey for the proposed road had already been made from Claymont to Wilmington. Among those interested in the enterprise are: Garrett J. Hart, James C. McComb, Peter J. Hughes, E. T. Cooper, A. J. Whittingham, Richard R. Kenney, and J. Clayton Erb, of Philadelphia.

BALTIMORE, MD.—A new fender ordinance has been introduced in the council which provides that cars shall be equipped with life guards, the front edge of which shall not be more than six inches above the track. The companies are allowed 60 days in which to equip their cars with a device of this kind, and a penalty of $5 a day is provided for each car not equipped after the expiration of that period.

ST. LOUIS, MO.—A school of instruction for the motormen of the Union Depot Railway Company has been established, as the men have petitioned the officials of the road for it. W. C. Gotshall, engineer-in-chief, who is an entertaining lecturer on electricity and mechanics in general, has been asked to give them a talk once a week. A large room in the machine shop building has been fitted up for the purpose.

PHILADELPHIA PA.—The Hestonville, Mantua & Fairmount Passenger Railway Company has commenced a suit against the West Philadelphia Passenger Railway Company and the Philadelphia Traction Company to secure an injunction restraining the defendant companies from laying tracks on certain streets in West Philadelphia. It claims that the plaintiff alone has the right to operate a street railway on the streets mentioned.

CHICAGO, ILL.—The coroner's jury in the case of Jacob Curran, a three-year-old child who was killed by a horse car on May 18, has recommended that the driver be held to await the action of the Grand Jury on the charge of criminal carelessness. It was also recommended that a change be made in the city ordinance governing the operation of street cars, so that cars will stop at the nearest instead of at the farthest side of the street crossing.

PHILADELPHIA, PA.—The two teamsters who were recently arrested for blockading cars of the Electric Traction Company on Front Street, have been discharged by the Court on the ground that they were not guilty of violation of the ordinance relating to delaying cars on street railways. The Court held that the ordinance only provided a penalty in cases where wagons stopped in the middle of the streets and not where they were backed up against the curb line for purposes of unloading

PHILADELPHIA, PA.—Application was made last week to the Common Pleas Court for an order discharging the officers of the Northeastern Elevated Railway Company from their position as trustees. When it was decided by the Supreme Court that this company had no right to construct an elevated road under the Pennsylvania law, it was decided at once to wind up the affairs of the company. The officers of the court were made trustees of the few assets that the company possessed, and as all debts have now been paid, the court is asked to dispose of the money and relieve the trustees.

BROOKLYN, N. Y.—All the employees of the Brooklyn Elevated Railway Company with the exception of the engineers are to receive an advance in wages on June 1. The pay was reduced 10 per cent in October, 1893, because of the reduced receipts, and the advance will restore the old figures. In the notice announcing the increase in pay, the general manager states that there is no danger that the wages will again be reduced, because the earning of the company as now assured will permit of fair wages so long as the streets of Brooklyn are not used for rapid transit purposes. The notice also states that the company is only enabled to increase the wages, because high speed is no longer possible on the surface lines in consequence of the new city regulation.

TRADE NOTE.

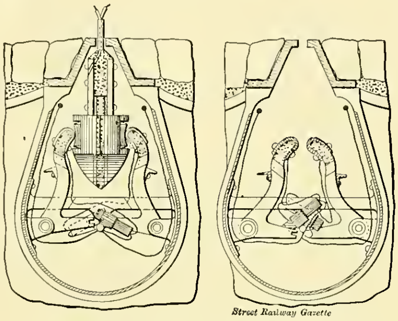
THE GRAHAM EQUIPMENT COMPANY, of Boston, has lately shipped trucks to Butte, Mon., Tampa, Fla., and Bangor, Me., and is receiving orders from many sections of the West. The new equalized brakes, with which they are equipped, have added greatly to the excellence of the trucks. Since this new addition has been placed on the truck, the business of the company has increased wonderfully. The brakes are so made that the greater the load, the greater the retarding power. Formerly, as the truck was loaded, the shoes went lower down on the wheels, decreasing their efficiency. Now they travel upward and occupy a better position, and the motorman has a quick acting positive brake.

Record of Street Railway Patents.

UNITED STATES PATENTS ISSUED MAY 21, 1895.

539,404. REGULATING ALTERNATING-CURRENT INDUCTION MOTORS; Albert H. Armstrong, Schenectady, N. Y., assignor by mesne assignments to the General Electric Company, same place. Filed Dec. 5, 1894. This is an alternating-current street railway system, the cars being equipped with three-phase motors. The regulation follows a method similar to that employed in direct current street railway systems.

539,418. CONDUIT SYSTEM FOR ELECTRIC RAILWAYS; Wilson H. Cotton, St. Louis, Mo. Filed Aug. 25, 1894. A current collector depends from the car, having positive and negative contact surfaces, electrically concealed with the motor and adapted to rotate. Opposite arms or frames are hinged to supports in the circuit, and to each of them a contact bar is attached, but insulated therefrom. The bars lie a suitable distance apart along the path of the current gatherer. From each of the frames a lever projects for actuating a pivoted box or vessel hermetically closed and inclosing the contact points of the feed wires leading from the main conductors. (See illustration.)


Street Railway Gazette

Nos. 539, 418.—CONDUIT RAILWAY SYSTEM.

539,440. CAR FENDER; Wilbur A. Peck, New Haven, Conn., assignor of one half to Stephen R. Raynes, same place. Filed Jan. 29, 1895. The fender consists of a vertical support adapted to be attached to a car frame to which a right-angled frame is pivotally connected, so as to swing in a vertical plane. There are flanged shoes on the forward end of the latter frame adapted to engage with the rails. Mechanism connects a lever on the dashboard with the right-angled frame, by means of which the shoes are caused to engage with the rails.

539,444. EMERGENCY RAIL BRAKE; Enoch Prouty, Chicago, Ill. Filed March 21, 1895. This is a brake which was invented for use on cable trains in Chicago to add to the safety on the steep grade in the tunnels under the Chicago River. Means are provided for raising and lowering a pivoted arm so that a blade rigidly carried on the rear end of the arm is wedged with the rail.

539,508. CAR FENDER; Joseph J. Feely, Walpole Mass. Filed Nov. 9, 1894. The fender is pivoted to the end of the car body. Springs are connected to it, and to the car body below the pivotal connection, when in its normal position. Stops are provided for limiting the downward motion of the fender. A flexible sheet or apron is attached to the front end of the fender, and to a spring-actuated roller at or near the front end of the dasher.

539,516. TROLLEY FOR ELECTRIC RAILWAYS; John W. Hoag, Newark, N. J. Filed Jan. 19, 1895. A bracket is connected with the trolley arm, comprising therein a tubular post with a trolley carrier arranged on it, and an arm. The post and carrier have oppositely projecting arms. Provision is made for connecting the arms so as to maintain them on the post in line on the trolley carrier, allowance being made for lateral movement.

539,530. SANDING DEVICE FOR STREET CARS; William A. Mitchell, Boston, Mass., assignor of one half to Frank O. Furber, Saco, Me. Filed Jan. 16, 1895. A valve which is actuated by the foot, controls the delivery of sand in front of the wheel through a pipe from the hopper. A device in the hopper has outwardly projecting pins, means being provided for actuating it.

539 542. MAGNETIC CAR BALANCING DEVICE; William B. Purvis, Philadelphia, Pa., assignor of one half to John Alexander Craig, same place. Filed May 26, 1894. A series of connected magnets is suitably supported on one side of a car. A switch at one end of the car has an arm in an electric circuit and a contact plate is adapted to be engaged by the arm. Wires lead from the contact plate to the end magnet farthest from the switch. A connection is made with the magnet at the other end of the series and the adjacent axle of the running gear of the car.

539,564. CAR FENDER; Joseph Zeis, Trenton, N. J. Filed April 17, 1894. The fender consists of a lead plate projecting forward from the front platform of the car, and provided with one or more stiffening-bars forked at the inner end. Brackets projecting from the car platform are provided with a removable pin, against which the stiffening bar bears. A netting is secured to the forward end of the bed-plate and stretches over its upper surface to and over a roller which extends across the car front. There is a yielding attachment of the rear end of the netting to the bed plate behind the roller, so that the netting may sag, when required. A roller extends across the front of the fender in advance of the netting and is journaled in extensions of the bed-plate. A pair of wheels rests upon the track, and serves to support the fender, so that the forward roller does not touch the ground. An axle is journaled in the stiffening bars upon which the pair of wheels is mounted, and a gear wheel is mounted on the axle and turns with it. A sprocket wheel is mounted upon an independent axle journaled in the stiffening bar, and means are provided for communicating motion to it from the gear. A sprocket wheel and chain mechanism connected the wheel first mentioned with the forward roller, and is adapted to communicate motion to the roller, independently of the motion of the car wheel, and in a direction the reverse of that of the fender wheel, whereby the forward roller tends to sweep up into the netting objects coming in contact with it.

539,579. ADVERTISING SIGN; Samuel P. Ferrer, Brooklyn, N. Y. Filed March 2, 1895. An advertising sign is held in the concave rack of a street car, with its top projecting forward of the vertical plane of the base. There is a movable part pivoted to it, which is adapted to oscillate under the impulse of the motion of the car. A loop of wire is attached to the sign limiting the oscillation of the swinging portion.

539,592. RAILWAY CONSTRUCTION; Friedrick Pfeiffer and Carl Lier Walkenried, Germany. Filed Aug. 18, 1894. The railway superstructure for preventing displacement of rails, consists of continuously running concrete track supports, which are made of cast concrete blocks secured by dovetail wedges. The sleepers serve for stiffening as do also a layer of concrete and two lugs of the fish plates let into the blocks.

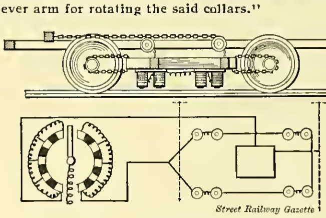
539,616. ELECTRIC BOND CLAMP; Alfred Green, Rochester, N. Y. Filed Aug. 27, 1894. The clamp comprises a loose gib, provided with a groove to fit a bond wire or rod. There is a hole adjacent to the groove, and a bolt is inserted in it. The bolt is provided with a bead having a groove corresponding to that already mentioned, means being provided for tightening it on the web of the rail.

539,670. SNOW OR ICE REMOVER FOR RAILWAYS; Joseph H. Colvin, Richmond, Ind. Filed March 18, 1895. The snow plow or shovel is adjustably and reversibly attached to the frame or body of the car. There are longitudinally extending levers which are suspended beneath the car body, and lifting bars adjustable longitudinally. A vertical standard is fixed upon the body of the car, and to it an adjustable lever is pivoted at one extremity. A vertically arranged standard or connecting bar is pivotally mounted, as a depressible fulcrum upon the free ends of the longitudinal levers, and at its upper extremity is pivoted to the adjustable lever.

539,676. CAR FENDER; William C. Ellis, Memphis, Tenn. Filed Aug. 17, 1894. This is the combination with a pivoted fender of a pivoted plate, rotably mounted forked arms connected with the plate and pads connected with the fender, and having projections beneath which the forked arms are adapted to engage.

539,681. BASE FOR TROLLEY POLES; Alfred Green, Rochester, N. Y. Filed Sept. 5, 1894. The base comprises a base plate formed with a socket step, which is lined with a series of rolls. A swiveling head is provided with an arbor fitted within these rolls, and having a spring tension arm with separate cross head, which has holes and tension screws, which have double hooks. The pole is provided with fork arms, which have eyes, and which are pivoted upon the centre of the head. The double hooks are formed each of a rod bent first forward and then backward and fitted to the eyes.

539 695. BRAKE APPARATUS FOR RAILWAY OR STREET CARS; Carlo Margutti and Guglielmo Miani, Milan, Italy. Filed May 10, 1894. The claim reads as follows: "The combination of brake shoes adapted to act against the wheels of a car axle, of a drum rigid on the axle, loosely mounted collars, a bell crank lever having a pivot mounted on the collars, a brake band passing around the drum and having its two extremities connected respectively with the pivot and the lever arm of the bell crank lever, a pivoted lever connected with the brake shoes, a rod connection between the pivot of the bell crank lever and the brake shoe operating lever, and devices connected with the lever arm for rotating the said collars."


Street Railway Gazette

Nos. 539, 726.—MAGNETIC TRACK BRAKE.

539,726. SYSTEM OF CONTROLLERS FOR ELECTRIC MOTOR CARS; Charles L. Coombs, Washington, D. C., assignor to Theodore D. Dale, Marietta, O. Filed Nov. 12, 1894. A frame is suspended in the car truck, and to it magnets for braking purposes are secured. The poles of the magnets are arranged to ride over the track rail. Means are provided for magnetizing the electro magnets and for moving them toward and from the track. (See Illustration).

539,735. SAFETY-GUARD FOR CARS; Samuel A. Groff, Washington, D. C., assignor by direct and mesne assignments to Patrick James A. Smith and W. Kesley Schoepf, same place. Filed Nov. 3, 1894. The guard rails of a car have pendent arms pivoted to handle bars so that when the former are lowered from the top or roof of the car the handle bars are swung in a downward direction.

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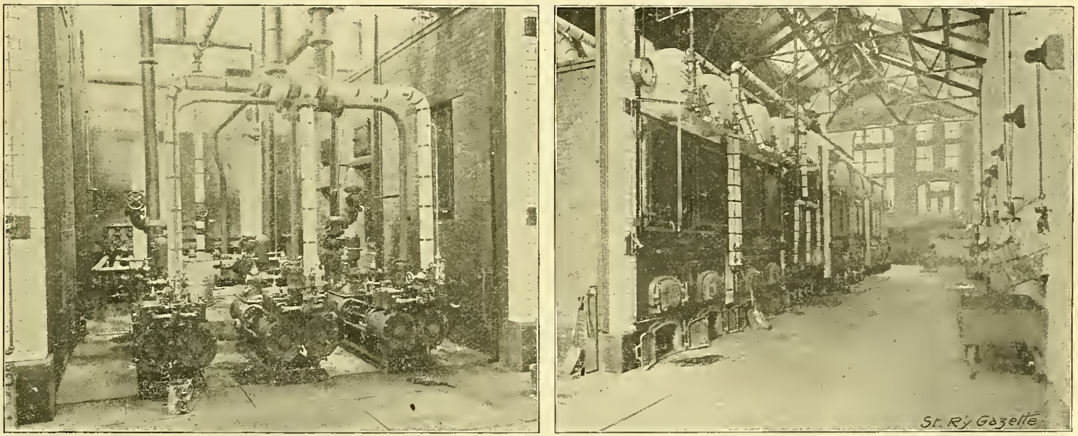
The Hestonville, Mantua & Fairmount Passenger Railway.—II.

The boiler room of the Hestonville, Mantua & Fairmount Passenger Railway Company, Fig. 2, is located on the east side of the building and its dimensions are 150 by 42 feet. Steam is generated in three batteries of two 250-hp water tube boilers furnished by the Babcock & Wilcox Company. The boiler fronts are of enameled brick, and brass pipe fittings are used throughout. The smoke flue extends the entire length of the division wall between the engine and boiler rooms and discharges into a brick stack which is 12 feet square at the base and rises to a height of 150 feet. From a point 35 feet above the base, the stack is octagonal in form and at the top is surmounted by an ornamental cap.

As has already been remarked the facilities for handling fuel are complete and convenient. Coal is brought in barges on the Schuylkill River to a wharf in the rear of the building and is unloaded by means of an elevator and conveyor, manufactured by the Link Belt Machinery Company, and erected by Armstrong & Pringtzhoff, of Philadelphia. The coal is carried to a pocket which has a capacity of 1,000 tons, built along the east wall of the boiler room. Coal chutes lead thence to each boiler. For removing the ashes small cars are used which travel to the wharf in the rear of the building.



FIGS 1 and 2.—PUMP AND BOILER ROOMS.

Water is taken for feed and condensing purposes from the river and is delivered by pumps to a cold well located in the basement of the engine room. The crib from which the water is pumped is located inside of the wharf line and is provided with a grating to protect the ends of the pipes from drift and ice. The pumps, which are of the Worthington duplex type, have an aggregate capacity of 40,000 gallons. They are located in a small brick pump house, constructed independently of the main power station, Fig. 3. The circulating water for the condensers is taken directly from the cold well and that for feeding purposes is pumped from the hot well located under the boiler room floor through the heaters and thence to the boilers. The piping is so arranged that in case of an accident to the heaters, the water may be pumped directly from the cold well to the boilers. The water from the condensers is also delivered to the hot well before entering the boilers. The capacity of the cold well is sufficient to supply the station for a considerable time should any accident happen to the main supply pumps. As an additional precaution, the cold well is to be connected to the city mains, so that an abundant supply of water is always assured. A Berryman feed water heater is provided for each engine and is located under the engine room floor. In addition, two heaters of the same type of 1,000 horse-power each are located in the boiler in the space provided for that purpose between the second and third batteries of boilers. In the same location are placed the feed water pumps, four in number, of the Barr type, Fig. 1. The arrangement of the steam piping system is admirable. The contractors for this part of the work were Best, Fox & Co., of Pittsburgh. The Pratt & Cady Company valves are employed on all main steam lines. The main stop valves on the boilers are of the Climax type, manufactured by Best, Fox & Co. The station is equipped with the Edson recording gauge.

About 20 miles of road are operated from the station. The track, which is of the most substantial character, was laid by Charles A. Porter & Co., of Philadelphia. The girder rails were supplied by the Johnson Company and are nine inches in height, weighing 90 pounds to the yard. They are spiked directly to yellow pine ties spaced 18 inches from the centres. The special work was also supplied by the Johnson Company. The joints are electrically connected by the well-known Johnston bond, which was designed by the chief engineer of the company. According to the ordinances in Philadelphia, all the railway wires, with the exception of the trolley conductor, must be buried, and to accommodate these a conduit has been constructed on each side of the track, Fig. 4. It is made of Lynch Lake terra cotta and is located about two feet below the surface. The depth is sufficient to render the danger of injury from passing traffic very remote. The other companies in Philadelphia have used creosoted wood for conduits, but it is believed that the terra cotta will prove far more substantial and more desirable in every respect.

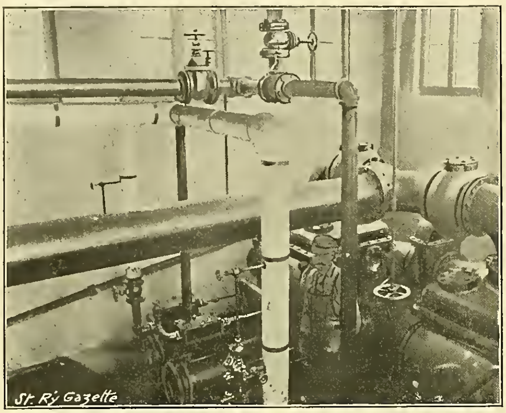


FIG. 3.—MAIN SUPPLY PUMPS.

The manholes are located at each square and are of an elliptical shape, three feet by five feet and six feet in depth. This form was followed for the reason that in the estimation of the chief engineer it would make the construction much stronger than if a rectangular shape had been adopted. One course of brick is found to be sufficient for the walls, while two would have been necessary to withstand the strain if the ordinary shape had been followed. At every third manhole a feeder is carried through a branch conduit to the base of a side pole and extends through its centre to the ornamental cap where it passes outside and enters the bottom of a special terminal box where connection with the trolley wire is made. This arrangement is shown in detail in Fig. 5.

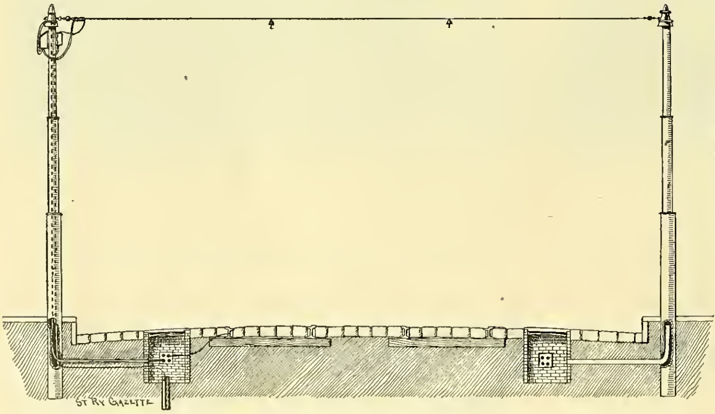


FIG. 4.—SECTION OF ROADBED SHOWING MANHOLES AND FEED CONNECTIONS.

The construction work on the Haddington & Fairmount Park Railway which the company has recently acquired will be completed in about two weeks. For the present this line will be operated from the present power plant, but eventually a new engine and a new generator will be added to meet the demand for increased power.

The terminal box is made of one-inch oak, its dimensions being about six by eight inches, and is bolted to the pole just below the cap. The feed cable coming from the branch conduit, as it has already been described, enters the base of a cast-iron cup about one inch in height and two and one-half inches in diameter located on the bottom of the box. It is filled with paraffin to insure thorough insulation and is provided with a hard rubber cover. The end of the cable extends through the cup and the paraffin and above the latter is stripped of insulation for three quarters of an inch. It terminates in a metallic cone-shaped thimble which extends through and above the rubber cover for a distance of three quarters of an inch where it is bolted to a piece of metal having a cone-shaped opening adapted to fit over the thimble. In an extension of the former a hole is drilled and into this the trolley wire is fastened.

The feed and trolley wires are attached to a movable bottom of the terminal box which is so arranged that it may be slid out to facilitate the making of connections.

A Wurts lightning arrester is attached to the pole on the side opposite to that on which the terminal box is located. The wire leading from the arrester passes through an opening in the pole through the centre of the latter, to the ground and thence under the branch conduit to the manhole where it is connected by a Johnston rail bond to a flat rail, which extends into the ground some little distance below the bottom of the manhole.

All the manholes are connected to the side poles by branch conduits which are designed merely to afford ventilation except those employed, as already described, for carrying the feeders to the terminal box.

Each pole has two openings through which gas from the manhole may pass out, and is surmounted by a hood to prevent air from dripping in.

The drainages of the manholes is provided for by pipes extending to the gutter. Connections with the sewer were not made for the reason that there would be danger at high tide of the water backing up. The water may be easily pumped out from the manhole into the gutter by a small portable pump in case it may be necessary.

The poles used are for the most part located at the side of the street. They are wrought iron and made in three tubular sections, six, five and four inches in diameter. They are set in six feet of concrete except those used on Spring Garden Bridge, which are set in iron castings fastened by expansion bolts to the columns. Some of these are guyed by two and one-half inch gas pipe, which carries the feed wires from beneath the bridge floor. The top of each pole is filled with an ornamental cap with a wooden plug giving additional insulation. There are, therefore, three separate insulators between the trolley wire and the earth, first the hanger, second the span wire insulator, and third the insulator formed by the plug at the pole top. The poles were designed by the chief engineer and were made by the firm of Morris, Tasker & Co., of Philadelphia. The trolley wire is No. 0 hard-drawn copper wire having a tensile strength of 4,400 pounds. The span wire is a seven-strand galvanized steel cable five sixteenths of an inch in diameter, and is attached to insulators which are fastened to eye bolts in the pole caps. The trolley wire and span wire were furnished by John A. Roebling's Sons Company. The lead-armored lapped cables which are employed as feeders range in size from 300,000 to 700,000 circular mils in section, and were supplied by the Standard Underground Cable Company, of Pittsburgh, Pa.

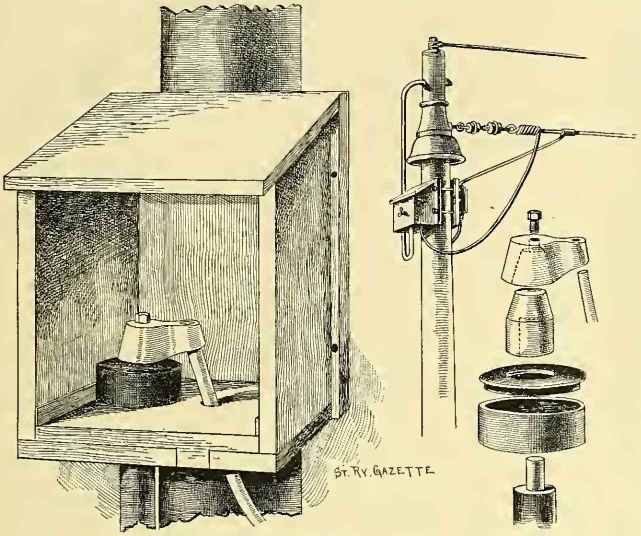


FIG. 5.—TERMINAL BOX.

On the principal bridges the overhead line is equipped with the Johnston automatic safety disconnectors which cut out the feeders in case of a break in the circuit. At the numerous crossings the Nelson insulated overhead crossings are employed. The contractors for the overhead work were Pepper & Register, of Philadelphia.

The company operates about 70 cars which were built by the St. Louis Car Company. A general idea of their appearance may be gained from Fig. 6, which represents one of the last horse cars on the system as well as one of the first of the new motor cars. The cars are handsomely decorated and the interior finish is mahogany. The cars are mounted on Peckham & Bemis trucks and are equipped each with two 25-horse power General Electric motors.

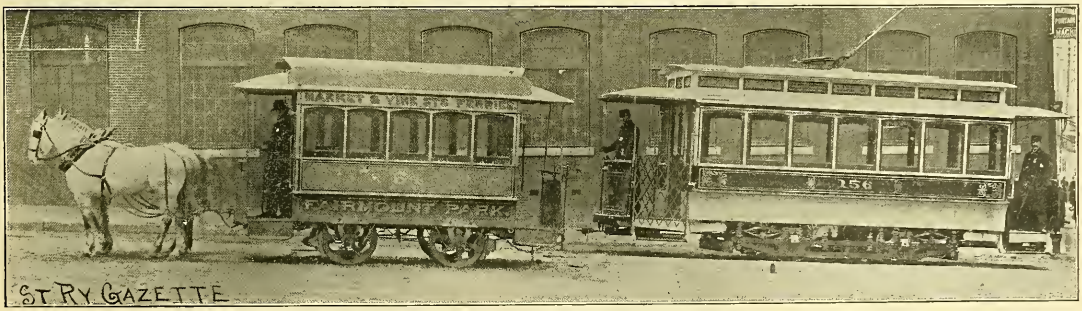


FIG. 6.—LAST HORSE CAR AND FIRST MOTOR CAR.

The old car house and repair shops at Forty-third Street and Lancaster Avenue have been remodeled and filled with transfer tables and improved machinery for making all necessary repairs.

The officers of the company are: Johns Hopkins, president; Isaac Blum, vice-president and general manager; W. R. Benson, treasurer; A. Langstaff Johnston, chief engineer; D. A. Haggerty, assistant chief engineer.

Victory of the New York Third Avenue Company.

The protracted contest between the Third Avenue Railway and Metropolitan Traction Companies, of New York City, for the franchise in St. Nicholas Avenue, Eleventh Avenue and Kingsbridge Road ended last Monday in a victory for the Third Avenue Company. The vote of the aldermen was 20 to 11, not quite enough to pass the ordinance over the mayor's veto, but it is thought that little difficulty will be encountered in getting the one additional vote required to override a veto. One of the features of the contest was the irregular offers of bonuses in addition to the percentages which the act of the legislature compels railway companies to allow the city. The Metropolitan Company offered a bonus of $100,000, and the Third Avenue Company raised this to $250,000, a figure which the Metropolitan met. Both companies made liberal promises in the matter of transfers, and, whatever else may come of the big contest, the citizens of the annexed district will derive benefits from it.

Transfer Ticket Bill Defeated.

The bill compelling the West End Street Railway Company, of Boston, to issue free transfer tickets, has been defeated in the State Senate. The measure passed the House by a large majority, but only secured six votes of six senators. Several speeches were made in opposition to the bill to the effect that it would involve an expense of half a million to the company, and would not result in giving better transportation to the public. The officers of the West End Company have expressed great satisfaction over the defeat of the bill. One of them is quoted as saying that had the measure become a law it would have cost the company not less than $500,000 and possibly as high as $2,000,000 per annum.

Electric Railways and Tramways in Great Britain.

BY ALBERT H. BRIDGE.

We English are a nation proverbially conservative in our ways, and in regard to the adoption of electricity as a motive power for tramways and railways, we are about as slow as we have ever been over anything in the way of mechanical change. Though there have been points in our legislation which, until very recently, have militated—and do so at the present time, but to a less extent—against progress in this direction, this has not been so potent a cause as has our hopeless destitution of the go-ahead spirit which is characteristic of you on your side of the Atlantic. In any new scheme of work, be it mechanical or electrical, if there appears to be any possibility that improvements may be effected, our municipal councillors, investing public, and last, but not least, our financial critics, are very anxious to delay operations, waiting still a little longer in order to take advantage of such likely improvements. There is no doubt that upon this ground more than one good and useful scheme has been postponed indefinitely, for rather than take up ventures which a short period of time may prove to need overhauling and even remodeling, we prefer to wait, and the general public meanwhile wonders why we are so far behind the age. This tendency has been evidenced very lately in some British provincial districts when the electric light question has been presented for consideration.

The present scarcity of electric tramways and railways in Great Britain is due to this spirit probably more than to any other cause. Altogether we have not more than seven or eight lines of electric tramways of any consequence, and only two or three railways worked by the same force. The past twelve months, however, have done their work in turning the verdict more in favor of electric tramways, and 1895 may well be considered as starting a new era in electric traction here, for brighter times are already in sight.

TRAMWAYS.

Of the lines already working the following merit mention:

Blackpool Street Tramways; operated by Blackpool Corporation; opened in the year 1883 on the Holroyd-Smith system; worked for some years; plant thrown out and operation by horses resumed in December, 1893, but through no fault in the system.

Birmingham line; worked on the accumulator system, and financially successful; one type of accumulators recently abandoned in favor of another; operated by a company.

Portrush (Ireland) line; operated on the Siemens & Halske system; turbines used; worked by a company for about twelve years, but no dividend yet paid on ordinary capital.

Leeds line; Thomson-Houston system; working commenced 1891. The corporation now contemplates extensions.

South Staffordshire line; overhead system with underground feeders. This is one of our most important systems; a company works the line.

Isle of Man tramway; Dr. John Hopkinson's system (Mather & Platt); line opened in July, 1894; dividend of 7½ per cent. paid on ordinary capital at the end of first six months' working; so successful that within three months extensions were considered necessary and advisable.

In addition to these, there are several small lines working more or less satisfactorily at watering places on the coast, such as Brighton, Southend, Guernsey and Ryde.

There are at present in course of construction several somewhat important systems. In about a month an extension of the old line of tramways, at Bristol, will be completed. This extension, as well as the old line which was formerly worked by horses, will then be worked by electricity, the British Thomson-Houston Company having taken the contract for the engines, boilers, dynamos and other electrical appliances, including cables and cars. This will be our first line erected under the new Board of Trade regulations promulgated at the end of 1893. The line will be nearly four miles in length. Some 135-ihp Willans engines and Adamson's Lancashire boilers will be used, also Vicars' mechanical stokers and Green's fuel economizers, the stokers and scrapers for the economizers being driven by electric motors. Other installations of less importance are being completed out at Dublin, Llandudno, Coventry, and a tramway from Llanberis, in Wales, up Mount Snowdon. In addition to these a number of local governing bodies have the matter under consideration.

RAILWAYS.

Of electric railways we have only two of any importance—the Liverpool Overhead Railway, and the City & South London Underground, both lines being worked by companies. The Liverpool line has progressed very satisfactorily in every way, particularly financially, as it paid a small dividend shortly after running commenced. The City & South London line, while being very satisfactory as an engineering enterprise, has not given satisfaction financially. The line has been at work five years or more, and yet the limited area which it serves renders it difficult even to secure a 1 per cent. dividend for the ordinary stock. Extensions at both ends of the line are to be carried out when the investing public is in a mood to provide the necessary money.

The Great Northern & City Railway recently invited subscriptions for £1,000,000 odd to construct an electric railway from a suburban district to the metropolis, a line which was generally considered to be actually needed. The public was, however, too cautious, and as the application for shares was not sufficient, electricity has been abandoned, at least for the present. Application is now being made to Parliament for power to work the line by steam locomotives.

The Mersey Railway Company has a bill before Parliament giving it the privilege of substituting electricity for steam. If the change is made it is estimated that a saving of £24,300 will be effected annually.

The Central London Railway, also under the metropolis, is well under way.

The electric railways now under construction are mostly in the metropolis and include the Waterloo & City Railway which runs in tunnels for its entire length under the Thames, and at a great depth under the City of London streets, a distances of over three miles. This road will not be completed for about two years.

Electric Railway in Rome.

A franchise has just been granted to the Societa Romana degli Omnibus for the construction of an electric railway in Rome, Italy. The road, which will extend from the general postoffice to the principal railway station in the city, will be operated by the overhead trolley system. It is expected that the work will be completed by Sept. 20.

Some Practical Notes for Motormen.—II.

BY GEORGE T. HANCHETT.

We have obtained a tangible conception of the quantities, voltage, and current in their comparison with pressure and pounds per minute in hydraulic flow. Resistance, however, is more obscure. Imagine, if you please, various pipes, one of which is just the roughest casting full of fins and burrs on the inside, while the next is better finished, the snags being knocked or filed off, and the third is thoroughly polished and presents an unbroken internal surface. Let these pipes be of the same length and internal diameter. Now, if we connect these pipes across the gap from a supply pipe to a waste pipe and insert a water meter as in Fig. 2, we shall find that the quantities of water that flow per minute are different, some being larger than others. This we can readily account for by saying that some of the pipes present more resistance to the flow than do others, and we could readily predict which pipe would carry the most water in a given time, or, in other words, which would carry the strongest current.

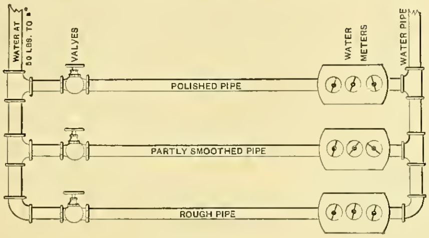


FIG. 2.

Now, suppose we vary our experiment, as indicated in Fig. 3. Let us connect between a supply and return wire, or, in other words, a pair of electric mains, several long wires of the same gauge, but of different metals, such as iron, brass, copper and German silver. If we now insert an *ampere meter* or *ammeter* as shown, we shall find that different amounts of current flow even though the wires be of the same length and gauge.

(Caution: Do not try this experiment on a railway circuit.)

To explain this, we must at once assume that a similar conception to that of the pipes, namely, that different kinds of metals present very different resisting powers to the electric current. This is precisely the case, but here we cannot predict which of the wires will have the greater current.

The resistance of equal and similar volumes of metals arranged for comparison is called their specific resistance or resistivity. Several standard volumes are in use, as, for instance, a cube one centimetre square, or a wire one foot long and $\frac{1}{1000}$ of an inch in diameter. Our knowledge of resistivity must be derived from experimental results. Electricians have measured the resistivity of almost all known metals.

Taking silver as unity, their results are approximately as follows: Silver, 1.00; copper, 1.001; gold, 1.25; sodium, 2.67; aluminum, 2.94; zinc, 3.45; cadmium, 4.22; brass, 4.55; potassium, 4.81; platinum, 5.55; iron, 5.95; tin, 7.63; lead, 12.05; German silver, 13.00; antimony, 21.75; mercury, 62.50; bismuth, 83.30; graphite, 1430.00. If we were to continue this table with regard to some substances, we should find their resistivity so great that they would practically offer a complete obstruction to electric flow. Such bodies are called insulators. Prominent among them are: Oils, parraffin, shellac, resin, rubber, gutta percha, ebonite, slate, marble, glass, paper, porcelain, fibre, celluloid, and many specially prepared compounds.

Insulators are used to support and protect conductors from electric leakage. Strictly speaking, there are no perfect insulators or conductors. No body has a resistivity so high that a sufficient electric pressure will not force some current across it, and none a resistivity so low that it will not offer some resistance to the electric current.

Resistance may also be compared to the water in a pipe in two other ways. It is obvious that more pressure will be required to force a current of water through a long pipe than through a short one, other things being equal. This is true of electric wires, but there is an additional advantage, the pressure necessary to force a given current through is exactly proportional to the length. This makes it very convenient for calculation.

Similarly, a pipe of large area offers less resistance to the flow of a given quantity of water per minute than a smaller one, and we have the same true of electric wires. We also have another very convenient fact for calculation purposes. The pressure necessary to force a given current through a wire is inversely proportional to the area of the wire.

These three properties of resistance may be summed up in the following statement:

The resistance of any wire is proportional to three things:

First. Directly as its resistivity.

Second. Inversely as its area.

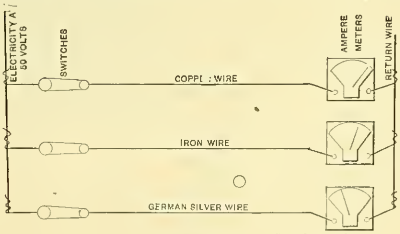
Third. Directly as its length.

From these facts the following rule has been derived:

The resistance of any wire is equal to

$$R = \frac{l}{d^2} K.$$

where R = resistance of a wire; l = length in feet; K = resistivity using one foot $\frac{1}{1000}$ of an inch as a basis; d = diameter in $\frac{1}{1000}$ of an inch.



Street Railway Gazette

FIG. 3.

For those who desire to use this rule, a table of values of K, the resistance of a wire one foot long and .001 of an inch in diameter is given. This table is accurate.

Silver, annealed	9.048
Silver, hard drawn	9.824
Copper, annealed	9.608
Copper, hard drawn	9.828
Gold, annealed	12.38
Gold, hard drawn	12.60
Aluminum, annealed	17.52
Zinc, pressed	33.83
Platinum, annealed	54.47
Iron, annealed	58.43
Nickel, annealed	74.92
Tin, pressed	79.45
Lead, pressed	118.0
Antimony	213.6
Bismuth, pressed	789.0
Mercury	572.1
German Silver	125.9

(To be continued.)

To Enjoin the Construction of the Boston Subway.

The suit brought by several property owners in Boston to restrain the Rapid Transit Commission from proceeding with the construction of the subway to be used by street cars in the central district of the city was called before Judge Knowlton last Tuesday. F. A. Brooks, counsel for complainants, explained the position which they had assumed. The powers of the Rapid Transit Commission were, he said, despotic. The State had no power to authorize a body or commission to build the subway at an expense to be borne by the city of Boston. The commission began the work in the Public Garden on a spot not included in the act.

It was claimed that the Public Garden was exempted from any assault of this kind, as the city held a contract that the Public Garden should not be devoted to any use other than what it has been used for years past, except for a site for a city hall. Another objection was that the subway was not for a public use. It was also objected that the act provided for the taking of land by right of eminent domain with no compensation for the taking. The work was to take up 50,000 square feet of land in the Public Garden for which no compensation was provided by the act. This land for commercial purposes was worth $20 per square foot. The seizure was claimed to be in violation of the contract now existing between the city and the State regarding the use that should be made of the garden. This taking was an impairment of the obligations of this contract, and in direct violation of the United States Constitution, that no law should be passed to impair the obligation of contracts.

Solomon Lincoln represented the commission. He asserted that the plaintiffs had no case whatever. "They allege themselves," he said, "as taxpayers, inhabitants and as individuals of the city of Boston. We submit the suit cannot be maintained at the suit of ten or more taxpayers. The court will not deal with it under the general equity powers of the court. There is no allegation in the bill that the city in its corporate capacity has voted to make an illegal appropriation of the city money. There is no corporate act of the city complained of in this case. The plaintiffs, therefore, do not bring a case that the court will afford them relief as taxpayers either under the general equity powers of the court, or under the statute. As individuals they have no standing in court, because they do not allege they have sustained damages as inhabitants. Neither do they allege that they own private property which is injured. The bill complains that the citizens of Boston are deprived of their rights of local self-government. To that I say that it is not for 17 taxpayers to complain. It is for another authority to complain. The Constitution of this Commonwealth and the Supreme Court have decided that the legislature may legislate in this way. It has always been understood that the rights of the State extended over roads and bridges. What is done by the city or town comes not from the town or city, comes not from the right to local self-government, but as agents of the Commonwealth.

"I suppose there would be no question by the other side that the legislature could delegate this authority to the city. That being so, there is no reason why the State cannot delegate such authority to its own agents. The allegation, therefore, that the act infringes the fundamental right of the citizens to local self-government is a fundamental error, as there is no fundamental right to local self-government. Nor is the allegation in the bill that the act creates taxation without representation well founded. The objection that the carrying out of the duties of the act is in excess of the lawfully authorized debt limit of the city is fully answered by the statement that the State can fix the debt limit, and did fix the city debt limit, and that means that it also has the power to revoke or amend it at any time. That is what the State, in effect, has done by the enactment of the subway act.

"It is claimed that, assuming that the act is constitutional, the construction to be placed upon it is that it does not authorize the Rapid Transit Commission to take land on the Public Garden. We say that it does. The act provides that the 'commission may construct a subway or subways * * * from Tremont Street, through and under Boylston Street and the adjoining mall of Boston Common or other public or private lands adjoining said street.' This says that they may take and use public and private lands adjoining Boylston Street. The Public Garden is either public or private land. We say that it is public land, and that it was lawfully taken by the commission under the act."

House Moving Case.

A not infrequent cause of trouble stirred up unusual excitement in Millville, N. J., this week. William Barnes had taken a contract to move a frame house from High Street in Millville to a vacant lot in the northeastern section of the city. It was necessary to cross the tracks of the Millville Traction Company, but the company refused to cut its trolley wire in order to allow the house to pass. When the contractor prepared to cross the tracks regardless of the refusal, the officers of the company appeared on the scene with a policeman, who placed Barnes under arrest. A large crowd gathered, and, sympathizing with the contractor, threatened to make trouble. When the officers and employees of the traction company began to remove the obstructions from the track, Mayor Payne put in an appearance. He ordered the traction officials to leave alone the obstructions placed by the contractor on the track, and, in a short speech to the crowd, stated that he had granted to Mr. Barnes a permit to move the building, and those who laid their hands on his moving apparatus did so at their peril. He instructed City Marshal Rutter to arrest any person who tried to remove the obstructions, and swore in a number of special officers to guard Mr. Barnes's property.

On the following day the crowd made such a demonstration when the contractor appeared upon the ground and proposed to resume work that the sheriff read the riot act.

The disturbance came to an end when the company obtained an order from the Vice Chancellor summoning Mayor Payne, Eugene B. Goodwin and William Barnes to appear before him in Camden, to show cause why a permanent injunction should not lie against them, to prevent them from interfering with the Millville Traction Company in running their cars. As soon as the order was served Barnes stopped work on the building. The traction company claims that a section of the State Street Railway law imposes a fine of $50 or ten days' imprisonment on any person obstructing trolley lines, and that is their charge against Barnes. They say that Mayor Payne, by his action, is equally guilty with Barnes. The latter has furnished bail for his appearance in court to answer the charge.

Street Railway Engineers.—VII.

MR. E. J. BECHTEL.

Mr. E. J. Bechtel, the electrical engineer of the Toledo Consolidated Street Railway Company, began at the bottom of the ladder and has worked his way up to a position of no small responsibility in the electrical field. He has had an opportunity to gain a detailed practical experience which has well qualified him to fill the position which he now holds. He was born in Des Moines, Ia., and received his education in the schools of that city. In 1887 he entered the service of the Hess Electrical Company, of Des Moines, and was employed as wireman and in repairing electrical machinery. Two years later he was engaged in the armature-winding department of the Des Moines Street Railway Company. In 1891 he took charge of the armature room and electrical repair department of the Citizens' Street Railway Company, of Indianapolis. Subsequently he served as the assistant of Mr. W. S. Jewell, the electrician of the company, and of Mr. H. B. Niles, who held the same position. During this time the electrical equipment of the road which had formerly been operated by horses was in active progress. In 1889 the electric lines aggregated 15 miles of track, but the system was rapidly developed into one of 100 miles. At the same time the capacity of the power house was increased from 250 hp to 2,500 hp. In June last, Mr. Bechtel was appointed electrical engineer of the Toledo Consolidated Street Railway Company, and in this position he is likely to find an abundance of work to employ his activities, as the company proposes, in the near future, to construct a new power station and otherwise to improve its plant. Mr. Bechtel recently referred to the changes and improvements in apparatus which had been made during his comparatively brief connection with street railways. He had worked, he said, with railway motors of about 14 different kinds, starting with the old 10-hp double reduction type and ending with the present single reduction motors of 25, 30 and 50 hp. During the same time the generators had developed from 60 to 80-hp machines belted to a line shaft into the present 500 and 1,000-hp direct coupled units.

E. J. BECHTEL.

A Physician's Incorrect Report.

An interesting point in an accident case has recently been decided by the Supreme Court of Minnesota. A suit was brought against the Minneapolis Street Railway Company, by Elida E. Nelson, to recover damages for injuries sustained by her while riding on one of the defendant's cars. The physician who was employed to attend the plaintiff assured her that her injuries were not likely to be serious, and relying on his statement, she settled with the company for a comparatively small amount, giving to it a full release. It appeared, subsequently, that she had been injured much more seriously than the physician had led her to believe, and she decided to bring an action against the company for an additional amount. The court finds that there is no evidence that the opinion given by the physician was not in good faith, and the fact that it was incorrect, constituted no ground for the rescission of the settlement and release.

Trolley Mass Meeting.

A mass meeting was held in the Academy of Music, in Philadelphia, last Saturday evening, to protest against the speed at which electric cars in the city are operated. About 1,000 persons were in attendance. The meeting was called to order by Thomas Martindale, who said that the representatives of the several companies had asked him to state at the meeting that the cars in use in the city were the best procurable and that the electric system was not surpassed by that of any city. He had been informed, he said, by one company that it had ordered 1,100 fenders at a cost of $25 each which would be immediately attached to its cars. Mr. Martindale stated that he believed the electric system had come to stay and all that he believed it necessary to do was to insist upon a proper enforcement of proper laws to govern its operation so that the safety of the citizens might be secured.

The Rev. Wallace MacMullen made an address in which he argued that the motormen and conductors should not be required to work over ten hours a day. He made an appeal for the passage of the law regulating the hours of labor, saying that it was necessary in the interests of humanity and the safety of persons who were compelled to use the streets, as well as for the comfort and health of the men themselves.

Rev. W. I. Nichols, in a brief speech, claimed that cars were operated at too great speed; that not enough cars were operated; that the hours of labor were too long, and that fenders should be attached to the cars. George Chance denounced the companies for refusing to allow their employees to belong to labor organizations. He also claimed that the men should not be required to work over ten hours daily. Letters were read from Archbishop Ryan, Bishop Whitaker and Senator Penrose, regretting their inability to be present, but expressing their sympathy with the objects of the meeting. A series of resolutions was adopted, urging that laws should be adopted tending to prevent accidents; that the work of motormen and conductors should be limited to ten hours, and that cars should be vestibuled. The Councils were also denounced in the resolutions for regulations they had passed for governing the operation of cars. In conclusion the resolutions requested the mayor to instruct the police to report the cases of injury to persons by electric cars with a view to ascertaining the best regulations in respect to changes that might make the street railway service more safe.

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ELECTRIC TRACTION ON STEAM LINES.

From the success that has attended the operation of suburban electric lines, steam railway companies have learned the value of the overhead trolley system, and it will not be long before many branch lines now traversed by locomotives will be equipped for electric traction. Two important experiments of this kind will soon be made. The installations on the Mt. Holly & Burlington branch of the Pennsylvania Company, and the Nantasket Beach line of the New York, New Haven & Hartford Company are nearing completion and we shall soon be afforded an opportunity to see the advantages attending the introduction of the new operating system. Although the contrary has been stated, there seems to be in the equipment of the two roads mentioned no important departure from the best street railway practice. The construction has been of the best description, but the value and economy of construction of this kind has long ago been demonstrated in the street railway field. We have not the slightest doubt that the operation of the two roads will be successful in all respects, and if our steam railway friends can teach us anything of value regarding the operation of electric roads, we shall be glad to learn it.

THE ELECTRIC RAILWAY IN QUEBEC

It seems hardly credible that in these days of enlightenment and progress objection can be made to the introduction of an electric railway because by affording increased facilities to the public it will interfere with existing interests. On that ground, however, was based the protest of a deputation that recently waited on the mayor of Quebec and urged him to take a stand against an electric road. They maintained that the improvement would cause the ruin of the hackmen, the carriage makers and the blacksmiths. The mayor heard them patiently and then dismissed them with the statement that so far from granting their petition he would exert all his influence to secure modern transportation, as the city had already suffered enough from an extreme policy of conservatism until it was far behind the times. It is safe to predict that with a mayor of this kind the ancient capital will begin to grow more modern and we shall soon hear of a movement for a greater Quebec. The mayor might have assured the deputation, although it appears he did not, that the electric railway would be a powerful means of promoting the prosperity of the city in which all the trades would share.

ELECTRIC TRACTION PROSPECTS IN ENGLAND.

According to the writer of an article which appears in another column of this issue, the failure to equip English tramways with the electric overhead trolley system has been due to conservatism which fears to adopt the improvement lest it should not prove to be completely developed, but would yield to something better in the near future. The officers of some of our street railway companies can doubtless sympathize with this feeling when they contemplate the amount of money represented by scrap piles, but at the same time they realize that had they acted upon an extreme conservative policy, they would not now be able to operate their lines with the splendid electrical machinery with which they are equipped. We cannot understand how English tramway managers can still be disposed to regard with doubt the electrical equipment that is now procurable. Surely it long ago reached a point of development where it left the experimental stage. We are glad to note that a tendency toward electric traction now seems probable, and that the present year is likely to mark the beginning of a period of active progress in the English tramway field. When up-to-date electric roads are introduced, the people will wonder that they remained so long satisfied with the wretched local transportation facilities that are now provided.

TWO MASS MEETINGS.

Two mass meetings have recently been held, one in Philadelphia and the other in Brooklyn, to take action expressive of public sentiment regarding the operation of electric cars in the two cities. Public interest in the transportation question had been excited in each case by fatalities which had recently been caused by street railways. In comparing the reports of the two meetings, we notice a radical difference between the two gatherings in respect to the manner in which the topic at issue was considered. The Philadelphia assemblage contented itself with discussing the question in a dignified way, and little that was said could be regarded as altogether unreasonable or offensive. The Brooklyn meeting was entirely different, if the reports of the local papers are to be believed. The audience conducted itself like an excited mob at a political gathering, hissing every one who was suspected of fair dealing with the street railway companies and denouncing the officers of the companies in the most extravagant manner. In looking over the reports of the two meetings we are struck by the fact that no suggestion of value was made of means to decrease accidents unless it be the recommendation of several speakers at the Philadelphia meeting that the working day of the motormen and conductors be limited to ten hours. Were a change in this respect calculated to reduce the number of casualties caused by street railways we have not the slightest doubt that managers would be only too glad to introduce it, but we believe that no one acquainted with the facts will assert that any considerable number of accidents is due to the fact that the men are overworked. There is a practical difficulty, however, which would stand in the way of changing the working hours as an experiment. Street railway employees are not skilled workmen, and their pay, therefore, is not large. Should their working time be decreased their wages would be reduced proportionately, a result which would create general dissatisfaction. The number of accidents on street railways is, unfortunately, too great, and we hope to see it greatly reduced in the near future. We expect this improvement to be effected, however, not by the introduction of any novel methods of operation, but by the employment of better employees, by a stricter enforcement of discipline and by the education of the public in the belief that greater care should be exercised on streets where cars are operated.

Why the Milwaukee Street Railway Company Failed.

In a recent issue of the STREET RAILWAY GAZETTE reference was made to the statement of Henry C. Payne that the necessity for the appointment of receivers for the Milwaukee Street Railway Company was the result of the hostility of certain representatives of the city government. In a recent communication to the Milwaukee City Council, Mr. Payne reiterates this charge and shows that he probably would have been able to secure capital to tide the company over its financial troubles had not certain aldermen taken action calculated to impair the value of the street railway property.

Mr. Payne says: "My criticisms apply only to a small minority of the members who have been diligent and unceasing in their efforts to harass the company and to obtain the enactment of measures which, as I have repeatedly stated to the railway committee, would destroy the company. Every alderman knows that during the last several months, nearly all the time, ordinances have been pending to cut down the rate of fare which we were allowed to charge below 5 cents. At the last hearing had on this subject, I stated that if the Council should not pass the proposed ordinance, we would extend our transfer system to all the lines, so that a person could start from any part of the city and go to any other part upon the payment of one fare. The Council took the action suggested and the company immediately in good faith put the proposed transfer system in operation. I stated at that hearing that we were in great financial distress and that the agitation of these measures impaired our credit and ability to obtain additional capital, and pleaded with the aldermen that they would give the company a chance and not continue this agitation, as it made it impossible for me to raise additional money because it had the effect of absolutely destroying the confidence of capitalists in the good faith of the city government in its relations toward the street railway system.

"The Council repudiated the ordinance by a vote of nearly two to one, and I hoped and expected that this question was settled for a long time to come. Acting upon that theory, I had secured a pledge of two thirds of the amount necessary to carry the company through without going into bankruptcy, and there was little if any doubt of the securing of the balance. At the critical juncture, Alderman Thuering reintroduced the measure compelling us to sell 25 tickets for $1, which is equivalent to cutting our fare to 4 cents, and compelling us to give at least one transfer to a passenger. This action at once destroyed all hope of obtaining additional capital. While I endeavored to point out the fact that the previous action of the Council was an assurance that the City Council would not follow the lead of such an unreasonable and unreasoning faction as were responsible for the introduction of the ordinance, I was unable to overcome the feeling on the part of men with money to invest that they did not care to imperil further large sums of money where they would be constantly confronted with such attacks upon their investment."

Nantasket Beach Electric Line.

The work on electrically equipping the Nantasket Beach line of the New York, New Haven & Hartford Railway Company is now nearing completion, and the road will be in operation some time during the present month. The line is seven miles in length and extends from Old Colony House, on the Plymouth division of the Old Colony system, to Pemberton. The track has been laid with T-rails, weighing 78 pounds to the yard, and the joints are bonded by copper strips riveted to the base of the rail. The trolley wire is attached at a height of 24 feet above the rails to cross-arms extending from the poles. The power house is located at a point midway between Nantasket and the Old Colony House station. The structure is 83 by 110 feet, and the stack rises to a height of 115 feet. Power will be furnished by two Greene-Corliss engines built by the Providence Steam Engine Company. The General Electric generators, which are direct coupled, have a capacity of 800 kw each. The motor cars, which were built by the Barney & Smith Car Company, of Dayton, O., will be mounted on double trucks made by the Baldwin Locomotive Works, and equipped with two General Electric 2,000 motors. Just how many trailers will be drawn has not yet been decided. The work has been executed under the superintendency of Colonel N. H. Heft, formerly president of the Bridgeport Traction Company.

Lewis & Fowler Companies Consolidated.

The directors of the Lewis & Fowler Manufacturing Company and the Lewis & Fowler Girder Rail Company, of Brooklyn, have agreed upon a plan of consolidation and reorganization. The capital of the manufacturing company is $300,000 and that of the Girder Rail Company, $200,000. The reorganization plan proposes a new company with a capital of $200,000 bonds and $200,000 stock. It is proposed to give to the stockholders of the Girder Rail Company a share of the new company's stock for every two of their old stock, and to the stockholders of the manufacturing company one share of the new for every three shares of the old. The owners of the new stock have the privilege of subscribing for the bonds of the new company. D. F. Lewis said the new company would devote itself to the manufacturing of special work for tracks, to the making of electric snow plows and sweepers, of all kinds of brass and bronze fixtures for cars and of fare registers. The stockholders have approved the plan.

Albert H. Dollard Indicted.

The Kings County Grand Jury, in Brooklyn, last week, brought in an indictment against Albert H. Dollard, formerly president of the Lewis & Fowler Girder Rail Company and the Lewis & Fowler Manufacturing Company, both of which are now in the hands of a receiver. The indictment is the outgrowth of charges made against the management at the time of the failure. It was then claimed that false representations had been made of the financial condition of the company. It is charged in the indictment that Mr. Dollard, as executive officer of the companies, signed a declaration of a dividend when not only there was no surplus with which to pay it, but that the companies were insolvent. It appeared that two months after the dividend had been declared, the receiver was appointed. An investigation disclosed the fact that the finances of the company were in a very complicated condition and it was claimed that the stockholders were not likely to realize much from the wreck.

Why Lightning Arresters Fail to Protect.

In a recent lecture before the Franklin Institute, of Philadelphia, Alexander J. Wurts described somewhat at length the Wurts non-arc lightning arrester and the principles on which it is constructed. In the course of his address he said there was a side to the matter of the protection against lightning that was little discussed, and which was almost invariably overlooked by those to whom interruptions due to lightning are a matter of vital importance. This was the insulation of the apparatus to be protected. He continued:

''When a lightning arrester "fails to protect'' it is condemned, the general opinion being that the failure is due to some inherent fault in the lightning arrester. But we have already learned that a lightning arrester is nothing more than a spark-gap. It would be difficult, then, to conceive of anything fundamentally wrong with a lightning arrester, so far as offering an opportunity for discharge is concerned. We have also learned that disruptive discharges do not always embrace the opportunity for discharge which is offered by a spark-gap lightning arrester. This circumstance, a very frequently occurring one, explains why lightning arresters sometimes fail. Another and all too frequent cause is defective or improperly applied insulating material. In a certain sense a lightning arrester is a safety valve. One would not expect to protect a defective or weak boiler with a safety valve set to blow at or near the bursting strain of the boiler; no more should we expect a spark-gap lightning arrester to protect weak or defective insulation.

''Defective insulation results either from weak insulating material, or a faulty application of the insulating material. Generally good insulating material is used. Faulty application may result in two ways: (A) Through improper design; (B) Through carelessness or ignorance. Examples under (A) are: (1) exposed surfaces offering oportunities for surface " discharge,'' and this is not an infrequent occurrence in connection with insulating materials which would otherwise stand very high voltages; and, (2) insufficient allowance for a proper margin of safety. The effects of rough handling, heat and cold, damp and dry atmospheres, dirt and grit (this latter having a particular attraction for electrical apparatus, etc.), demand a margin of safety which is not always appreciated even by the designer. Under (B) might be mentioned a long list of details, such as bruises, cracks, pin holes, cuts, open joints, bits of metal imbedded in the insulation, sharp corners, etc., which will tend to lower the insulation strength 50, 75 or even 100 per cent. And at this point it should be observed that the weakest point in the insulation of a given piece of apparatus (it may be a pin hole or minute crack invisible to the naked eye) is a measure of its insulation strength.

''Repair work in shops of local electric light and power companies is liable to be more or less defective, and but few such companies are provided with testing sets. Repaired armatures and converters are placed in service and might stand indefinitely the normal E. M. F. of the circuit to which they are connected, but field discharges, lightning, rise of potential and proximity to other circuits carrying high potentials, demand a margin of safety which cannot be assured unless the insulation be actually tested with an E. M. F. from four to six times the normal.

''But, even though the insulation of apparatus be perfect and have its proper margin of safety when installed, deterioration may, nevertheless, occur from various causes, principal among which would be moisture and overheating. In general, it may be stated that if we undertake, by means of spark-gaps, to provide absolute protection against static disruptive discharges, the insulation strength must bear such a relation to the spark-gaps as to place it beyond the limit of selection. Ordinarily, however, absolute conditions do not occur in practice, we can but approximate to them and then philosophically accept a reasonable percentage of failures as inevitable.

"The failure of lightning arresters is too often due to careless installation. It may be instructive to note several examples:

"(1) One plant is reported as having, for better protection, connected two arresters in series. This was probably done with the idea that if a little was good more would be better.

"(2) A large bank of station arresters was grounded to an iron bolt about two feet long, driven into dry sand.

"(3) Line arresters were grounded by pushing the ground wires into the earth.

"(4) Line arresters were grounded on iron poles, which were themselves set in Portland cement.

"(5) An annual inspection of automatic lightning arresters developed the fact that the arresters were nearly all burned out—in other words, that the line was left unprotected.

"(6) The ground plate of a bank of arresters was thrown into a neighboring stream, which subsequently changed its course, leaving the ground plate high and dry.

"(7) The ground plate of a bank of station arresters was laid on the rock bottom of a neighboring stream.

"(8) In a large number of cases a portion of the ground wire is wound into a fancy coil (choke coil). And the list might be indefinitely extended, each such case forming a source of complaint that the arresters 'fail to protect.' But when these curious mistakes are located and properly remedied the complaints cease.

"Overhead wires become charged. They are discharged through lightning arresters, which are spark-gaps. Shifting points of high and low pressure are formed along the line, so that the discharge does not necessarily occur over the shortest or easiest path; that is, the discharge is selective. Lightning arresters offer opportunities for discharge. Coils protect. A liberal distribution of line arresters offers the only practical means of protecting widely distributed apparatus.

"Lightning arresters 'fail to protect'; first, because of the shifting high and low pressure points, or in other words, for lack of a sufficient number of line arresters; second, because insulation is defective; and third, because lightning arresters are not properly installed."

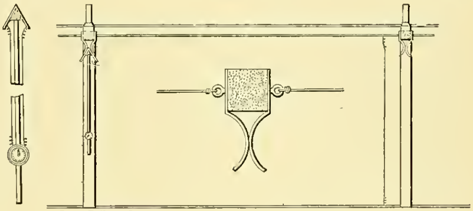
Receivership for the Electrical and Mechanical Engineering Company.

J. H. Vail has been appointed receiver for the Electrical and Mechanical Engineering Company, of New York, on the application of the directors. The company was incorporated two years ago with a capital stock of $150,000. The liabilities are $26,441 and the nominal assets $22,000. The most important of the assets is a contract with the trustees of the New York & Brooklyn Bridge for electric lighting of the cars, which is put down at $19,419. The claims of three creditors, the Third National Bank, $5,150; General Electric Company, $5,289; and Wallace & Sons, $913, have been secured by this contract.

Locating Faults in Track Circuits.

A patent has just been issued to John C. Henry, of Westfield, N. J., for a system by means of which faults in electric railway track circuits may be easily located. Ordinarily a fault in the track must be searched for between the points at which the feeders enter the circuit, and to determine the locality it is customary to use special testing instruments, more or less expensive in construction, or to hunt for it by digging up the street with the consequence that travel is interrupted to a greater or less extent. These methods were objectionable on this account, and because it is practically impossible to know the state of the entire track at any time by reason of the length of time necessary for effecting the various tests.

By the system proposed by Mr. Henry the entire track may be readily tested every day, if desired. The invention which is illustrated in the accompanying diagram provides for the use of a supplemental return conductor divided into sections connected preferably by spring switches. Each of the sections is connected to the track and so located and arranged that an ammeter may be inserted between them or between the supplemental conductor and its connection with the track, to measure the current. As ordinarily arranged, the main current returns by the track and the ordinary buried return conductor connected thereto for the purpose of lowering the resistance. The supplemental conductor is of comparatively high resistance. It, however, serves ordinarily to convey only a small percentage of the current back to the power house. Upon the occurrence of a fault in the track return, however, the current, instead of passing over the defective spot, will seek another path through the high resistance conductor, the resistance of which for so short a distance would necessarily be much less than that of any serious fault in the track return; while beyond the fault the current would again flow mainly in the track circuit, the supplemental conductor thus forming a shunt around the fault, while not interfering with the ordinary function of the track and its buried return as a conductor. The section of the supplemental conductor serving a shunt will carry a very much greater current around the fault than the other sections of the supplemental conductor wherein the resistance acts to cut down the current and confine it to the track. Thus, ammeters inserted between the sections or in the branch conductor will show a greater current passing in one section than in another and will locate the fault, which may be speedily repaired. Ordinarily means for inserting an ammeter may be placed upon each pole or in each manhole, where the conductor is carried in a conduit; but, in case of tramways in open country wherein the whole track structure is exposed to view, these switches may be located at greater distances apart. In order that readings may be taken more rapidly than ordinarily, the ammeter is arranged upon a pole and has its terminals upon the end


Street Railway Gazette

METHOD OF LOCATING FAULTS.

connected by wires to the ammeter. The operator may walk along from one pole of the road to another, and by inserting the ammeter terminals between the parts of the spring jack or switch, may take the readings rapidly and accurately, while at the same time the spring jacks or switches will be located so far above ground that they will be out of the reach of curious or mischievous interference.

Luhrig Gas Motor Car.

In the Street Railway Gazette of May 18 last appeared a description of the gas motor car which is in use in Dresden. The article was written by William S. Carroll, United States Consul General in that city, and his references to the motor were highly flattering. The United States Consul in Frankfort-on-the Main, Frank H. Mason, has taken no little interest in this motor and several of his descriptions of it have appeared in the Consular reports. Of its development he writes as follows in a recent number of *Cassier's Magazine:*

The conditions under which tramways are built and operated in most European countries differ somewhat from those which prevail in most cities of the United States. In general, street railways were adopted in the Old World long after they were successfully used in America, and since then, European tramway companies have been much more rigidly controlled in respect to speed, frequency of service, rates of fare and especially the cost of their franchises, than has been the rule under the generous and easy-going authority of most American cities.

Most European municipalities object to the trolley and to overhead wires generally; traction cables are rarely used, except in cases of heavy grades on suburban lines, and busy streets are rarely surrendered to steam tramways. Particularly is all this true in Germany, where sharp restrictions are made in respect to fares, frequency of service and the number of passengers which a car may carry. Crowded platforms and standing in aisles of street cars are generally forbidden. As a result of this and the high cost of horses and forage, the profits of horse railways in Germany have been, hitherto, rather limited, and the companies have been forced to exercise the utmost economy in equipment and management. Out of these general conditions has grown the gas motor street car, which promises important results in respect to economy, and which, during the past two years, has reached a state of development which has challenged the attention of engineers in other countries. The gas motor car which is now foremost in Germany was invented by an engineer at Dresden, named Luhrig, who hit upon the idea of a connection between the motor and running gear of the car by means of friction clutches controlled by the driver, so that the engine can be kept in continuous action while the car is in service, and the latter can be started and stopped by throwing the clutches into and out of engagement. In Luhrig's original model the car was equipped with two double-cylinder gas engines of the Otto type, one being placed under the seat on each side of the car. This made the car unduly heavy and costly, and, moreover, exposed it to an uncomfortable vibration at the moment of starting and when rounding an abrupt curve in the line.

In the midst of his experiments Luhrig died, and his invention was taken up by a corporation known as the Traction Syndicate, Limited, with offices at London and Dresden, at which latter point cars for use in Germany are now built. Under the management of the syndicate the car was rapidly improved and simplified, the motive power was condensed to a single, double-cylinder engine, and the weight and cost of the whole apparatus were proportionately reduced.

There are now in operation in Germany two lines of Luhrig cars of the latest and most improved pattern; one, about three miles long, at Dessau, which was opened for traffic in November last, and the other, the original line, at Dresden, leading from a central point in that city to a suburban village several miles distant. During the past year successful experiments have been made by the English branch of the syndicate, which built and operated an experimental car upon a tramway at Croydon, a few miles south of London.

Chicago Cable Mail Cars.

Mail cars are now operated on the Madison Street cable line of the West Chicago Street Railway Company. It is the purpose of the postoffice department eventually to extend the system to all the cable lines in the city. The new cable car was constructed by the Pullman Company. It is 30 feet long, with a platform 4 feet 6 inches long on either end. The width of the car is 7 feet 2 inches. The car is divided into two compartments, one fitted up for smokers and the other for mail purposes. The mail part of the car is closed to the public. It is an exact counterpart on a small scale of the railway mail car. It is fitted with letter and paper boxes and racks for mail bags used for the distribution and handling of the mails. The exact length of the mail car is 13 feet 1 inch. Washstands and water coolers are furnished for the use of the mail clerks. The interior is finished in quarter sawed oak, with a decorated ceiling of the same wood. The trimmings are of solid bronze, highly polished. The car is lighted from side windows and by a skylight in the roof. All the windows are provided with roller curtains. It is also furnished with incandescent electric lights. Outside the car is painted in what is known as postal white. It is lettered and decorated in gold leaf, having the words "United States Railway Postoffice" upon it.

The Trolley Mail Cars in Philadelphia.

Two mail cars are to be operated regularly on the Fourth and Eighth streets line of the People's Traction Company in Philadelphia. They were reconstructed from old horse cars at the shops, and are painted white with the usual lettering. The interior of the cars is fitted up in the same manner as that of the standard railway mail car. The cars will be used entirely for mail purposes, and no other person than the mail clerk will be allowed on board. The platforms will be enclosed by iron gates and provided with the usual brake. As the cars will be run as trailers, no motormen or conductors will be necessary.

Practical Test of a Fender.

The inventor of a new fender was placed under arrest in Brooklyn this week after giving a practical test of the life-saving qualities of his invention. The fender, which is one of the Brautigan type, was attached to a Fulton Street car near City Hall. Mr. Brautigan walked directly in front of the car and was picked up unharmed by the guard. A policeman who supposed that an attempt at suicide had been made arrested the inventor, but he was released when he showed his credentials.

Comment and Views of Contemporaries.

Open Street Cars.—The open street car is a great leveler of caste; at the same time it is a great elevator of spirits. The man who can not enjoy a spin on the open summer car will find fault with the pitched key when St. Peter leads the choir.—*Cincinnati Times-Star.*

Accident Problem.—The interests of a million and a quarter people, most of whom are workingmen traveling morning and evening to and from their places of labor, demand that they shall have as rapid and cheap transit as possible. The whole problem can be solved by fenders upon trolley cars and by the police authorities of the city absolutely preventing children from occupying our streets as playgrounds.—*Philadelphia Times.*

Stopping at the Near Crossing.—If the cars stopped before crossing the streets the speed on the crossings would be less, pedestrians would have more time to get out of the way and the gripmen and drivers would get a better view of the crossings before passing them. Trains are usually required to stop before reaching a railway crossing to prevent accident, and there are quite similar reasons for the stopping of cable trains and other street cars before crossing a crowded street.—*Chicago News Record.*

Electricity on the Manhattan Elevated.—As the cost of change from steam to electricity would, of course, be great, it is not to be expected that the Manhattan Company will make it unless the running expenses will be thereby largely diminished. But as the comfort of passengers and of people who live along the route would be greatly augmented by the substitution of electricity for steam on the elevated trains, the uptown residents of the city will be unanimous in offering heartfelt prayers that electric motors may be cheapened.—*New York Herald.*

New York Street Cars.—The attention of the City of New York is again called to the fact that its railway street system is 40 years behind the times. Horses are slow, unreliable, weak, and the cars they pull are not fit for people to ride in. The trolley or the cable is clean, steady, fast if necessary, readily managed, and the power is capable of pulling larger and finer vehicles than those battered little arks that creak and trundle up and down town in the largest and richest city of the continent. New York is behind dozens of little one-horse or one-trolley manufacturing towns in some ways.—*Brooklyn Eagle.*

Accidents.—The people outside are the ones to be considered, and to be protected. Of course, there is force in the argument of the manager, as showing that it is far safer to ride in these cars than to stay outside of them, and, therefore, this plea is an ingeniously good stroke of business. If every one rode no one would be run down by swift-running cars. Motormen could then safely fling prudence to the winds and run their cars at 20 or 30 miles an hour. The small proportion of deaths to the number of people transported would be even more striking. But, unfortunately for this system of calculation, and for the people themselves, the supply of nickles is limited, and the real needs of the people to ride are not so great as to require the whole population to take to the trolleys. The managers must devise some plan of rehabilitating the now discredited trolley in the public mind.—*Washington Star.*

Competition with Steam Lines.—The steam roads have already found the limit to which reductions in freight and passenger rates can go, and those who start into the business of common carriers in the belief that light roads with electricity as the motive power can profitably render the same services at a half or a quarter the rates at which the steam roads lose money are sure to acquire a valuable though expensive stock of experience in a few years. The numerous defaults and foreclosures of electric railway securities which have already taken place are forerunners of many similar calamities which are destined to mark the present craze for paralleling existing railways with electric lines. The trolley enthusiasts should remember that the steam railways can easily supplement their locomotives with trolleys, if it is advisable, using their tracks already built and supplied with every requirement for traffic, and this is liable to result in a reciprocal competition in which the aggressors are not likely to fare the best. The trolley street railways have a great mission for the improvement of short-distance transportation facilities, but there will be many mistakes made in disregarding their natural limitations.—*Railway Age.*

Slow Speed of Brooklyn Cars.—The people and the papers are making more fuss now about the slow time and disagreeable motions of the cars in slowing up so frequently than they previously did about casualties that occurred in consequence of faster service, and modifications of the regulations are loudly demanded. This simply teaches what the people ought to have sense enough to know without being taught—that faster street car service meant, at the start, a natural increase of accidents, until people learn to adjust themselves to the circumstances and keep out of the way of fast moving cars. The work of education was necessarily severe, but its lessons had to be taught. Now, when the work is practically accomplished, the cars are put back to their former snail's pace, and make poorer time than they did with horses. This is ridiculous, and, of course, cannot long continue. The restrictions must eventually be set aside and faster speeds adopted, and the people must simply learn to keep out of the way. The public convenience demands the rapid movements of street cars in all large cities; and those who have not sense enough to respect the necessities of the case and keep out of the way must suffer the consequences.—*National Car Bulletin.*

Trolley not a toy.—Circumstances such as that recorded yesterday, where street urchins amuse themselves by jumping in front of trolley cars "just to be picked up" by the fenders, are no doubt responsible for a number of the deaths recently charged against this mode of rapid transit. The irrepressible small boy knows no danger, and apparently cannot appreciate that an education of the people to the peril of the trolley is more necessary than the adoption of all the mechanical safeguards in the world. The *North American* has never attempted to underestimate the incidental risk of trolley transit, even though it has freely recognized its value as an improvement. But since the trolley has come to stay, a general recognition of this danger must be observed to insure any degree of safety. The trolley is not a toy. On the Ridge Avenue line, the urchins make life miserable for the motorman, severely try the nerves of neighbors and hazard their own lives by standing directly in front of an approaching car and jeering at the man in charge. This is another form of risky pastime—like that reported in the *Inquirer*—and the parents of these children must be made to forbid such dangerous play. We cannot expect to reduce fatalities while precocious brats are permitted to make of the trolley a sport and an amusement.—*Philadelphia North American.*

FINANCIAL NOTES.

EARNINGS OF THE BRIDGEPORT TRACTION COMPANY.—The earnings of the Bridgeport Traction Company for May were $25,270, and for the same month last year $12,237.

EARNINGS OF THE ROCHESTER RAILWAY.—The earnings of the Rochester (N. Y.) Railway for May were $69,332, an increase of $7,020 compared with those of May, 1894.

SIOUX CITY RAILWAY TO BE SOLD.—Judge Shiras has made an order directing the sale of the Sioux City Cable Railway to satisfy a $350,000 mortgage held by the Manhattan Trust Company.

EARNINGS OF THE PHILADELPHIA PEOPLE'S TRACTION COMPANY.—The gross earnings of the People's Traction Company, of Philadelphia, for May aggregated $178,982.62, an increase of $84,782.90 for May, 1894.

GENERAL ELECTRIC NOT TO MOVE.—Director Hastings, of the General Electric Company, is quoted as authority for the assertion that there is no truth in the statement from Schenectady that the company has been offered a large amount of money to consolidate its factories at one point in New Jersey.

SALE OF THE MIDDLETOWN RAILWAY.—The Middletown & Madison Street Railway, of Middletown O., has been sold by the receiver, Dr. Bundy, to B. F. Douglas, of Monroe, for $9,350. This price is over $700 less than that obtained at the previous sale which was set aside by the court.

WALLACE & SONS' PLANT NOT SOLD.—It was announced some time ago that the manufactory of Wallace & Sons, at Ansonia, would be sold to William H Clark, the millionaire mine owner of Montana. Preliminary arrangements for the purchase had been made, but the negotiations were abandoned at the last moment.

LONG ISLAND TRACTION REORGANIZATION.—Ex-Governor Flower is quoted as saying that the plan for the reorganization of the Long Island Traction Company which leases the Brooklyn Heights railway system of Brooklyn, would call for an assessment of about $10 per share and would involve a change in the management of the company.

EARNINGS OF THE BROOKLYN ELEVATED.—The Brooklyn elevated railroad companies continue to make larger gross earnings than on corresponding days last year. For the week ending May 27, the Brooklyn Elevated Railway increased in gross earnings over $3,257 the week of the same date and the average increase for the month of April was about $3,000 a week.

LA CROSSE, WIS.—The directors of the La Crosse, Black River Falls & Neillsville Electric Railway Company, which proposes to build a line to Black River Falls, have elected the following officers: President, Nathan Clark; vice-president, William H. Polleys; secretary, Paul McHugh; treasurer, T. J McHugh; auditor, William Beirne; superintendents of right of way, T. J. McHugh and W. H. Polleys. The survey for the road has been begun.

PLAN OF THE ALLEY "L" STOCKHOLDERS.—The Chicago *Tribune* says that some of the Alley "L" stockholders are discussing a plan which, if put into execution, may possibly put some obstacles in the way of the threatened foreclosure proceedings, which it will be difficult to surmount. "The scheme," it says, "is an ingenious one, and contemplates the putting on record in the county recorder's office by stockholders of all or a portion of their holdings. By this means it is expected to compel the bondholders, in the event of their instituting foreclosure proceedings, to bring suit not only against the company as a corporation, but also against each individual stockholder. This, it can be easily seen, would be a rather expensive operation. It is claimed there are cases on record where a plan in many respects similar to this has been tried, and found to work to the great advantage of the stockholders. The property would become involved in almost endless litigation, and the expectation is that rather than take such chances the bondholders would consent to much more favorable terms for the other side than are now proposed "

TRAFFIC ON THE METROPOLITAN ELEVATED, CHICAGO.—The officials of the Metropolitan Elevated Railway, of Chicago, refuse to confirm any of the estimates regarding the present traffic on the system. The guesses range all the way from 20,000 to 40,000 passengers per day. Secretary Higginson recently said in regard to the company's reasons for withholding information: "We have now only a fraction over six miles of road in operation and it would be both idle and unfair to attempt to gauge the earning power of the entire system by the present traffic. So far the showing made has been very satisfactory to the officials of the company. The main line will be opened some time between now and June 10, when the next series of ball games in Chicago will be commenced. Even that portion of the line which is in operation has not yet received anything like a fair test. The public has not yet got thoroughly used to it. It may surprise some people to learn that our trains are making better time than those of any other elevated road in the country. The run from Logan Square to Franklin Street, a distance of over six miles, is being made in 25 minutes, and this is a record that has not yet been equaled by any other company."

ELECTRICITY ON THE MANHATTAN ELEVATED.—The following regarding the change of motive power on the Manhattan Elevated system in New York appears in the Philadelphia *Stockholder:* "It was not asserted at the time, nor now, that arrangements for the change from steam to electricity had been finally made, but it was stated that the company was considering plans and estimates for a change of motive power. The work involved in making this change will be enormous, for it will require the erection and equipment of immense power houses, the construction of a system of electric supply rails along every track for every mile of road; in fact, a complete abandonment of the present system. The change must be so effected that it will not interfere with the operation of trains now in service. The expense will be between $2,000,000 and $3,000,000. Officials of the company continue to profess ignorance as to the contemplated change. It is not quite clear why they should assume this attitude, unless they are apprehensive of a bear raid upon the stock. And yet the change from steam to electricity will result in an enormous saving in operating expenses and should therefore prove a bull instead of a bear card. Despite their denials, however, it is known that the General Electric Company has submitted estimates for the change, and it is claimed that the work can be done so that not a train need be delayed while the work is under way; when completed the entire electric system can be put into operation at once and the steam engines retired.'

NEW INCORPORATIONS.

LA PORTE, IND.—The Michigan City & La Porte Street Railway Company has been incorporated by H. B. Tuthill, Alvin C. Tillotson, Alonzo S. Nichols and Jas. F. Gallaher, Michigan City, Ind. The capital stock is $10,000.

PITTSBURGH, PA.—The Fort Pitt Street Passenger Railway Company has been incorporated with a capital stock of $50,000. The promoters are Joshua Rhodes and Wm. B. Rhodes, Allegheny, and Jos. W. Latshaw, Pittsburgh.

LORAIN, OHIO.—The East Lorain Street Railway Company has been incorporated with a capital stock of $25,000 The promoters are William J. Garone, Wm. McReynolds, John W. McReynolds, John A. Park, Edward S. Meyer, last named of Cleveland, Ohio.

PITTSBURGH, PA.—The Coraopolis, Sewickley & Economy Electric Street Railway Company has been incorporated. The officers are: President, C. I. McDonald, Pittsburgh; vice-president, Simon Harrold, Beaver Falls; secretary, George A Lashell; solicitor, W. T. Treadway, and directors, C. I. McDonald, J. C. Whitla, Simon Harrold, John S. Duss, J. A. Ferguson, George A. Lashell and J. W. Arras. The capital stock is $150,000. At the same time a company was organized to build a bridge over the Ohio River from Neville Island to Hays station, to cost $60,000. The officers of the traction company are also the officers of the bridge company. It is the intention of the company to connect with the Pittsburgh, Neville Island & Coraopolis Railway, either at the lower end of Neville Island or at the lower end of Coraopolis. Should the bridge be built at Hays station, the route will lead through Osborne, Sewickley, Quaker Valley, Edgeworth, Shields, Leetsdale and Fair Oaks, to Economy, where it will connect with the People's Street Railway Company, which has already obtained the right of way from Conway to Economy. The new lines will then reach Legionville, Logans, Linmore, Baden, Remington, Conway, Freedom, Rochester, West Rochester and New Brighton. At New Brighton the new road will connect with the College Hill & Grandview Railway and the Beaver Valley Traction Company's line. It is the intention of the incorporators of the new company to eventually extend the road to Homewood, New Galilee, Enon and East Palestine, on the Ft. Wayne Railway, and to Industry, Cook's Ferry, Smith's Ferry, East Liverpool and Wellsville, on the river division of the Cleveland & Pittsburgh Railway. The real capital behind the new road is said to be the Second Avenue Traction Company.

NEWS OF THE WEEK.

OMAHA, NEB.—The Omaha Street Railway Company will build an extension to the State Fair grounds.

FRESNO, CAL.—An electric railway is projected to connect 13 vineyards on the east and south sides of Fresno.

EAST BRIDGEWATER, MASS.—The Brockton and East Bridgewater companies have been granted a franchise for the construction of an electric railway.

HARTFORD, CONN.—The Board of Aldermen last week adopted resolutions giving the Hartford Street Railway Company permission to build several extensions.

GREENSBURG, PA.—The Greensburg, Jeannette & Pittsburgh Electric Railway Company has purchased 50 acres of land near Grapeville and will convert it into a park.

PHILADELPHIA, PA.—In its report last week, the Grand Jury recommended that the law compelling street railway companies to place fenders on their cars be strictly enforced.

NEW YORK, N. Y.—The Southern Boulevard Railway Company has asked the State Board of Railroad Commissioners for permission to change its motive power from horses to electricity.

NEW YORK, N. Y.—Twenty-one men employed in the power house of the Union Railway Company struck on last Saturday on account of the discharge of one of the men. Their places were filled without difficulty.

ELIZABETH, N. J.—The first car from Newark to Elizabeth over the tracks of the Consolidated Traction Company was operated this week. It was decorated with flags and bunting and carried the officials of the company.

BOSTON, MASS.—The officials of the New York, New Haven & Hartford Railway Company last week made an inspection of the Nantasket Beach line which is to be electrically operated some time during the present month.

MONTREAL, QUEBEC.—A trailer jumped the track on the curve opposite Oliphant Avenue last Saturday night, and collided with a Windsor car traveling on the other track. Ten persons were injured, three of them severely.

BROOKLYN, N. Y.—Judge Clement has denied the application of the Nassau Electric Company for an injunction restraining the commissioner of public works from interfering with the construction of the company's line on Ocean Avenue.

AUBURN, N. Y—The commissioners appointed by the Supreme Court to report in regard to the advisability of constructing an electric railway through West Genesee Street in Auburn, have filed a report, stating that in their belief the railway described should be constructed and operated.

KANSAS CITY, MO—The West Side Electric Railway Company, of Kansas City, Mo, whose power house was recently destroyed by fire, has made an arrangement with the Metropolitan Company by means of which it secures power from the Wyoming Street power house of the latter company.

PATERSON, N. J.—The Paterson Street Railway Company has advanced the wages of its motormen and conductors 10 per cent. Two years ago the wages were reduced and at that time the company assured its employees that they would be advanced to the old figure when better times should make it possible.

PHILADELPHIA, PA.—A suit has been commenced by Edward D. Reilly and others against Thomas Craig and Clifford Beebe to compel an accounting in an electric railway transaction. It is alleged that a balance of $4,000 is due the plaintiff on account of the sale to the defendants of the Geneva & Waterloo Electric Railway at Geneva, N. Y.

BOSTON, MASS.—Two new records were made by the West End Street Railway Company on May 30. On that day it carried 700,000 passengers, the largest number ever transported in a day, and not a single accident was reported. The company never before escaped without accidents when an approximately large number of passengers were carried.

PITTSBURGH, PA.—A car on the Millvale, Sharpsburg & Ætna Electric Railway, which was running at a high speed, jumped the track at Pine Creek Station, on June 4, and rolled to the bottom of a 20-foot embankment, bringing up on the tracks of the Pittsburg & Western Railway. The trolley car was wrecked and all the ten passengers were more or less severely injured.

BALTIMORE, MD.—It is stated that compressed-air motor cars will be operated experimentally on the Baltimore, Catonsville & Ellicott City Railway. Arrangements for trial trips on this road have been completed by the American Compressed Air Motor Company. It is expected that the cars will be ready for use within two weeks. The compressors will be constructed by the Rand Drill Company, of New York.

BROOKLYN, N. Y.—Charles Franklin, chief trolley inspector, last Monday submitted to the mayor his May report, showing 390 violations of the speed ordinances. The Brooklyn Heights Company heads the list with 152 violations. Next comes the Atlantic Avenue lines with 92, the Broadway line with 60, the Coney Island & Brooklyn with 36 and DeKalb and Franklin Avenue lines with 50. The ordinance limits the speed to six miles an hour in the central parts of the city and eight miles an hour in the outlying districts.

NORRISTOWN, PA.—Pursuant to a decree of the court the cars of the Chestnut Hill & Norristown Railway Company ceased running on Tuesday night. The company has 30 days in which to remove its tracks, poles and wires. Petitions are circulating in Norristown addressed to the Supervisors of Plymouth township urging them to withdraw all proceedings against the company and permit the reopening of the road. A town meeting of citizens of Plymouth has been called to protest against the decree of the court and the act of the Supervisors that led up to it.

PERSONAL.

MR. J. H. SHAY, of the Munson Belting Company, of Chicago, Ill., was in New York this week.

MR. BENJAMIN NORTON, who recently resigned the presidency of the Atlantic Avenue Railway Company, of Brooklyn, retired last Saturday. Mr. H. M. Littell will assume the duties of president by July 1.

MR. W. A. H. BOGARDUS has resigned his position as secretary of the Brooklyn Heights Railway Company. He has been connected with Brooklyn street railways for about two years. Mr. Bogardus states that he leaves the company to accept a position with a business firm in New York City.

MR. P. J. QUINN, who has been for 20 years superintendent of the Atlantic Avenue Railway Company, of Brooklyn, has resigned his position and has been succeeded by D. S. Hoskins, who has heretofore been connected with the Twin City Rapid Transit Company, of St. Paul, Minn.

TRADE NOTES.

THE BERLIN IRON BRIDGE COMPANY, of East Berlin, Conn., have just completed a new boiler house roof for the Stanley Works, New Britain, Conn. The same company are the engineers and architects for the large three-story building which the Union Metallic Cartridge Company are now putting up at Bridgeport, Conn. The entire framework of the building will be of steel, with brick walls, and all appliances for making the construction as nearly fireproof as possible.

MEDBERY OVERHEAD TROLLEY EQUIPMENT.—The Fiberite Company, of Mechanicville, N.Y., is manufacturing a most complete line of street railway overhead equipment. It uses aluminum bronze metal, and a composition that is absolutely water-proof, and practically indestructible. It makes everything that pertains to the overhead equipment of electric railways, and the fact that the works have been running 24 hours a day, for over a year, is proof that the products are very popular. Among the improved specialties for overhead work, attention may be called to the company's insulated crossovers, circuit breakers and aluminum bronze trolley wheels. These wheels are guaranteed. They are made of aluminum bronze and while the metal is very soft and ductile, it is very fine and tenacious, and will not wear the trolley wire, yet will give a great amount of service. The company has also recently brought out a superior line of railway switches, which are finding a ready market, and the new principles involved show great advancement in this direction.

GRAPHITE PAINT.—Twenty five or 30 years ago the Dixon Company, of Jersey City, N. J., even then known as the largest manufacturers of graphite products, began the manufacture and introduction of graphite paint. Ticonderoga flake graphite was used and thoroughly ground in pure, boiled linseed oil. Roofs well painted with this paint did not require repainting for 10 to 15 or even 20 years. In time all this became a matter of record, and people, recognizing the economy as well as the durability of Dixon's graphite paint, demanded that their roofs should be painted with it. This demand, however, has led many painters to resort to sharp practices, or to make a graphite paint which they claim to be equal to Dixon's. Some painters are unprincipled enough to offer as graphite paint a compound having the color of graphite, but composed of stove polish, cheap black lead, or even foundry facings mixed with oil. Other painters, honest in their intentions, but ignorant that there is a vast difference in graphite, have used ordinary commercial black lead, ground with oil, expecting it would meet the requirements of their customers and prove lasting as the genuine Dixon graphite paint. So wide, however, is the difference in results, that experienced buyers insist on seeing the label on the package, or buy the paint themselves and have the painter apply it. Some time ago one of the departments of the United States Navy ordered 100 pounds of Dixon's graphite paint of a well known dealer. The dealer not having that quantity on hand in an original package, filled a keg from a barrel of Dixon's paint and sent it forward. It was promptly returned by the government officials with the remark that they had experimented enough with other makes and would only receive original packages.

THE SWINERTON WHEEL COMPANY, with offices recently located at 620 Atlantic Avenue, Boston, is now prepared for active business. The Swinerton railway driving wheel is by no means a new invention as since 1889 it has been used successfully upon prominent steam railways. Briefly described, the wheel is formed by cutting a large number of flat surfaces or facets around its periphery or tread which are connected with each other by very obtuse angles, so that when the wheel passes over the rail an inch is successively presented in actual contact with the rail, thus obtaining far greater traction, it is claimed, than is possible with the cylindrical wheel, which depends for its traction upon a line of contact not exceeding one sixteenth of an inch in width, so slight that scientific works state that if the contact of a locomotive driving wheel was any less than at present locomotion by railway trains would be impossible. The application of the wheel to electric railways has demonstrated that it possesses important advantages securing, it is claimed, more perfect traction, quick and complete control of car, overcomes grades, renders possible operation of cars with single motors, and draws the cars under all conditions of rail and weather without slipping and without sand. Until, however, something less than a year ago the wheel had never been applied to electric railway purposes. During this period its application has been closely watched, the defects have been remedied, and to-day it is claimed to be almost as perfect as it can be made. It has been in operation the longest upon the Newton (Mass.) Street Railway Company and Superintendent Henderson has evidently subjected the wheels to the most severe tests and says that "the perfected wheel seems to cover just what is wanted by all electric roads, particularly those who run cars with single motors. The facets have a value. They reduce slipping to the minimum and help a car along greatly on a bad rail." The new wheel weighs about 400 pounds as against 300 for the ordinary wheel, and it is claimed will run until worn out. The Newton Street Railway Company, it is understood, is equipping its cars as rapidly as possible with the latest form of Swinerton wheels. The Quincy & Boston Street Railway Company is using them. The Norfolk & Suburban Street Railway Company is equipping with them as fast as possible and the Lynn & Boston road has a set of these wheels that it is expected will be running on this road in about a month.

Record of Street Railway Patents.

UNITED STATES PATENTS ISSUED MAY 28, 1895.

539,786 CONDUIT ELECTRIC RAILWAY SYSTEM; Ferdinand Barrell, New York, N. Y. Filed July 19, 1894. A conductor support in the conduit is rigid and is formed in sections extending transversely of the conduit.

539,798. COMBINED TROLLEY HEAD AND WHEEL; William H. Dalbey, Indianapolis, Ind. Filed Oct. 11, 1894. This patent covers a self-lubricating trolley wheel.

539,816. FARE REGISTER; Frederick Marggraff and Charles Leisring, Waterbury, Conn. Filed Nov. 23, 1893 A series of registering drums is rotatably mounted upon a series of flanged hubs which are keyed to a hollow shaft. An operating cam which is U-shaped is pivoted to the hubs and is designed to be thrown into a forward or backward direction by contact of pins upon the adjacent drum. A spring-actuated pawl on the cam engages the pins on the drum mound upon the hub, and detent levers hold the drums in their proper position.

539,823. DEVICE FOR OPERATING SWITCHES FOR STREET RAILWAYS; Gotthelf Paschke, Berlin, Germany. Filed Feb. 26, 1895. This device for operating switches consists of a tilting casing in which there is a heavy ball moving freely. The ball determines the complete movement of the switch tongue and holds it in position. Connecting rods transmit the movement of the tilting casing to the switch tongue.

539,825. ELECTRICAL CONNECTION; Peter Reith, Chicago, Ill. Filed Feb. 28, 1895. The rail bond comprises cylindrical tubular terminals open at both ends and having conical bores. The tubes occupy and protrude through apertures in the rail and each has its protruding end swagged outwardly into the form of an angular flange resting against the web while its body is expanded into intimate contact with the rail. Conical or tapered bolts extend through the terminals having convex faced nuts. (See Illustration.)

539,836 TRAMWAY RAIL; William Towler, Leeds, England. Filed Jan. 22 1895. Patented in England Jan. 27, 1893. The rail has an enlarged head with flaring sides, on which the descending flanges of a rail cap have sufficient flexibility to be fitted by pressure and afterward bend outward again so that the head may be removed. Bolts pass through the flange and rail head, each bolt being provided with a nut, so that the flanges are drawn against the flaring sides of the head.

539,854. TROLLEY BREAKER; William G. Carey and Augustus A Ball, Jr., Schenectady, N. Y., assignors to the General Electric Company, same place. Filed Nov. 15, 1894. Metallic end pieces are secured to the body part, which is of insulating material, by bearings above the bottom line. There are other bearings against the bottom, the bottom line of the end pieces being in substantially the horizontal plane of the trolley wire. A connecting bar of insulating material in the plane of the bottom line of the end pieces forms a runway for the trolley.

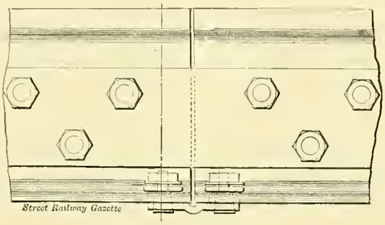
539,855. BRAKE-SHOE; William G. Carey, Schenectady, N. Y., assignor to the General Electric Company, New York. Filed March 4, 1895. This is a substantially circular brake-shoe for use in connection with an electric brake and has coil chambers sunk in the metal non-concentric with its axis of rotation.

539,895. WHEEL; John Graves, Brooklyn, N. Y., assignor to himself and Louis Monjo, same place. Filed March 16, 1894. The wheel is formed of a sheet metal web, the flange and tread both in one integral sheet of metal. The corrugations in the web are substantially radial to the centre of the wheel. The hub consists of an inner and an outer tube; the former flanges against one side of the web and upsets over the outer tube at the opposite end.

539,901. CAR FENDER; James W. Madden, Brooklyn, N. Y. Filed Aug. 22, 1894. The fender has horizontally turning wings and means are provided for operating them. The frame has an offset for holding the wings in a folded condition and allowing them to be released by pressure against the front. Hand levers act on the wings and restore the parts to position for work after they have been used.

539,931. RAIL-BOND; Frank E. Buxton, Worcester, Mass. Filed April 15, 1895. The bond comprises a wire or rod with substantially cone-shaped heads upset at each end and two loose collars with conical bores of slightly smaller diameter than that of the heads.

539,933 CAR TRUCK; Edward Cliff, Newark, N. J. Filed May 7, 1894 The lower halves of elliptic springs are located between the end portions of the upper and lower truck frames. The outer ends of the springs are shackled to the upper frame and their inner ends are shackled to the lower frame. Central bearings for the springs are provided and are received in sockets in the ends of the lower frame.


Street Railway Gazette

No. 539,825.—ELECTRIC BOND.

539,934. CAR-TRUCK; Edward Cliff, Newark, N. J. Filed Dec. 31, 1894. The cross-bar of the frame and the motor has one end mounted on the axle and at its centre upon the cross-bar a leaf-spring is mounted. Two pairs of lugs extend from the free end of the motor which is to be carried to opposite sides of the ends of the spring. Adjustable bolts extend vertically through the lugs and bear upon the spring.

539,935. CAR-TRUCK; Edward Cliff, Newark N. J. Filed Dec. 31, 1894. A hanger is secured rigidly to the frame on each side in the centre, and the upper half of an elliptic spring is supported at its centre by each hanger. Levers are connected to the ends of the springs by links and extend therefrom in opposite directions to the ends of the frame where they are connected The levers are fulcrumed intermediate of their length on the axle. Bolts extend downward from the hangers and have blocks moving vertically upon them. There are coil springs on the bolts above and below the blocks and links connecting the blocks with the inner ends of the levers.

539,976. CAR-TRUCK; Edward Cliff, Newark, N. J. Filed March 24, 1894. Extensions of the lower frame extend outwardly from the axle with half elliptic springs between them and the movable frame. Each of the springs has one end connected to the stationary frame of the truck and its opposite end connected to the movable frame. The upper half of an elliptic spring extends between the saddles on each side and links depend from ears on the saddles and are connected to the ends of the springs. A band around the centre of each of the latter springs is provided on its upper side with a projection which is received in a socket secured to the lower side of the movable frame.

539,977. CAR-TRUCK; Edward Cliff Newark, N. J. Filed May 7, 1894 A semi-elliptic spring is fulcrumed at its centre upon the end of the lower frame of the truck and is shackled at one end to the lower frame and at the opposite end to the upper frame. There are projections on each side of the axle box and passing through them are vertical guide posts held stationary in the yoke. There is a spiral spring between the box and the yoke and another between the yoke and the upper frame.

540,005. FENDER FOR STREET CARS; John Titley, Pittsburgh, Pa. Filed Jan. 25, 1895. There are bars secured to the car truck to which the rear ends of the fender are pivoted so that the fender and bars have a flexible connection with and movement on the truck.

540,010. CONDUIT ELECTRIC RAILWAY; Frank B. Widmayer, New York, N. Y., assignor of one half to Charles E. Ball, same place. Filed Aug. 3, 1894. The main conductor is incased in a waterproof covering or tube and a series of circuit completers is normally open and arranged at intervals along the road. An electrically propelled car is provided with means for successively throwing into operation a circuit completer, which comprises a horizontally pivoted lever having a vertically moving bar to connect it with one end thereof and a vertically reciprocating telescoping rod connected to the other end. It works through a stuffing box in a covering or tube and is provided with a contact for closing on the main (See Illustration).

540,029. MEANS FOR CONNECTING MOTORS TO CAR AXLES; Sidney H. Short, Cleveland, O. Filed Oct. 19, 1893. A swinging frame is journaled at one end of the axle, the free ends of the frame being provided with open bearings. The motor is journaled in the open bearings the motor trunnions being of such form that by turning the motor out of its normal position, they may be inserted within or disengaged from the bearings but when the motor is in its normal position they are retained against displacement.

540,054. LOCATING FAULTS IN ELECTRIC RAILWAYS: John C. Henry, Westfield, N. J. Filed Jan. 24, 1894. A supplemental return conductor is connected at intervals with the track or ground return and is divided into sections by spring jacks normally completing the circuit. A testing instrument is provided with terminals which are adapted to co-operate with the switches and cause the circuit between the two conductors to be completed through the instrument.

540,060. CONDUIT ELECTRIC RAILWAY; William E. M. Jackson, San Francisco, Cal Filed Oct. 25, 1893. This is an insulating support for a conduit electric railway and comprises an open non-conducting spiral, a containing cup, a cover and one or more auxiliary petticoated insulators.

540,063. SAFETY CAR-FENDER; Samuel C. Kindig, Baltimore, Md. Filed Oct 20, 1894. Upper side bars are used, the upper ends of which are free to have a limited movement to and from the car front. Lower side bars are also employed which are pivoted at their upper ends so that the front ends may tilt up. Springs connect the upper and the lower bars and serve to draw up the latter. A network fender is supported by the upper and lower bars and retracting means are provided for holding the lower side bars down against the lifting action of the springs, so that all the parts of the fender may have an up and down movement.

540,066 CAR FENDER; Benjamin Levy, Philadelphia, Pa., assignor of one half to Nicholas F. Hoffman, same place. Filed Nov. 23, 1894. The body portion of the fender has side frames and network and is open in front. There is also an inclined pivoted spring-supported bottom portion with a filling of network, in the forward end of which there is a yielding transverse roller journaled, while a brush is located beneath the fender.

540,068 TRUCK FOR STREET CARS; DeWitt Loomis, Detroit, Mich. Filed Jan. 7, 1895. Levers of the first order are hinged to the outer end of the truck frame, their outer ends engaging the outer ends of the car body. Double vertically acting springs are supported by the frame and engage the inner ends of the levers.

540,090. ELECTRIC PASSENGER REGISTER AND RECORDER; Joseph W. Ellis, Albany, N. Y. Filed Jan. 12, 1895. This patent covers a series of vertically movable step plates acting on mechanical connections and motion-transmitting devices. The latter control circuit closers. Electric circuits are closed by the depression of the step plates. Two registers having electromagnetic actuators in circuit with the respective circuit closers are provided with record card markers and marker actuating electromagnets. A clock is used for closing the circuit having a series of electric contacts, while a circuit connects the latter with electromagnet of both registers.

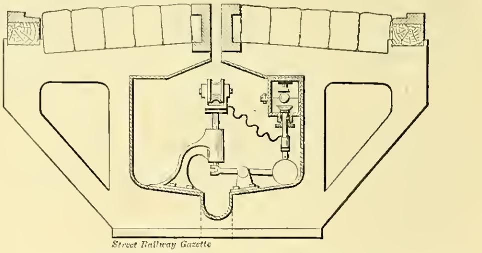
540,091 CAR-TRUCK; George B. Esterley, Fall River, Mass. Filed Oct. 6, 1894. The truck is provided with a frame having each side formed of an inverted approximately U-shaped bar. The axle boxes are connected with each other and each one is fitted to slide on one of the opposed faces of the depending sides of the bar. Springs are interposed between the boxes and the middle portion of the bars

540,100. RAILWAY SWITCH; Louis V. Johnson, Brooklyn, N. Y. Filed Feb 2, 1895. A horizontally sliding shifting plate is provided with a flange at each end. The flanges project above the top of the rails so as to come in contact with the wheels of the car. Intermediate mechanism between the plate and the switch point operates the latter from the former.

540,101. CAR FENDER; Edward L. Kelly, Philadelphia, Pa. Filed March 31, 1895 The fender consists of a support which is adapted for an attachment to the platform of a car and which has mounted to it a wheel revolving horizontally. The wheel is of rigid structure and is provided with a cushioned peripheral surface having a roughened outer face.

540,103. SWITCH ADJUSTER; John Kortan, Jr., Detroit, Mich. Filed Nov 28, 1893 This is a switch thrower for attachment to street cars and comprises a vertically movable rod with a blade at the lower end having curved fingers extending on each side.

540,106. CAR FENDER; Rafael Mayolini, New York, N. Y. Filed March 6, 1895. The fender comprises two spring sections, consisting of end bars and horizontal bars, the inner ends of the former being secured to the car and the outer ends being held in locked engagement, so that an arched fender with unbroken outer surface will be formed.


Street Railway Gazette

No. 540,010.—CONDUIT RAILWAY.

540,120. FENDER FOR STREET CARS; William N. Taggart, Philadelphia, Pa Filed Jan. 5, 1895. Rigid bars project in front of the car and a pivoted frame mounted thereon has an apron with a spring-actuated roller connected to it. It serves to impart tension to the latter, but permits yielding thereof. A stop bar arrests the downward motion of the inner end of the pivoted frame.

540,187. CLOSED CONDUIT SYSTEM FOR ELECTRIC RAILWAYS; Herluf A. F Petersen, Milwaukee, Wis. Filed March 26, 1894. A section or cover at one side of the conduit is supported upon suitable pivotal connections and carries short sections of the conductors and is adapted to be swung back into position so as to simultaneously open the conduit for the removal of the contact devices and move the short sections of the conductors out of the line of movement of the contact devices.

540,203. BRAKE-SHOE; James E. Worswick, Americus, Ga. Filed Nov. 10, 1894. The body portion of the brake shoe is formed of soft metal with transverse cutting portions of a harder material: the outer ends of the latter formed with outwardly extending flanged portions adapted to fit over the rim of the wheel when the shoe is pressed against it.

Street Railway Gazette.

Vol. XII. NEW YORK, JUNE 15, 1895. No. 24.

Electric Traction Company of Philadelphia.—I.

The street railway system of the Electric Traction Company, of Philadelphia, is operated from two power stations; the larger and more interesting of which is located on Delaware Avenue between Beech and Laurel Streets. The structure, which is unusually handsome in exterior appearance, is constructed of brick, Fig. 2. The front on Delaware Avenue is of pressed brick faced with brownstone for a distance of ten feet above the street. The building is constructed in two bays, in one of which the engines and generators, and in the other the boilers, are located. The roofs, which are supported by trussed girders, are provided with skylights, giving an abundance of air and light.

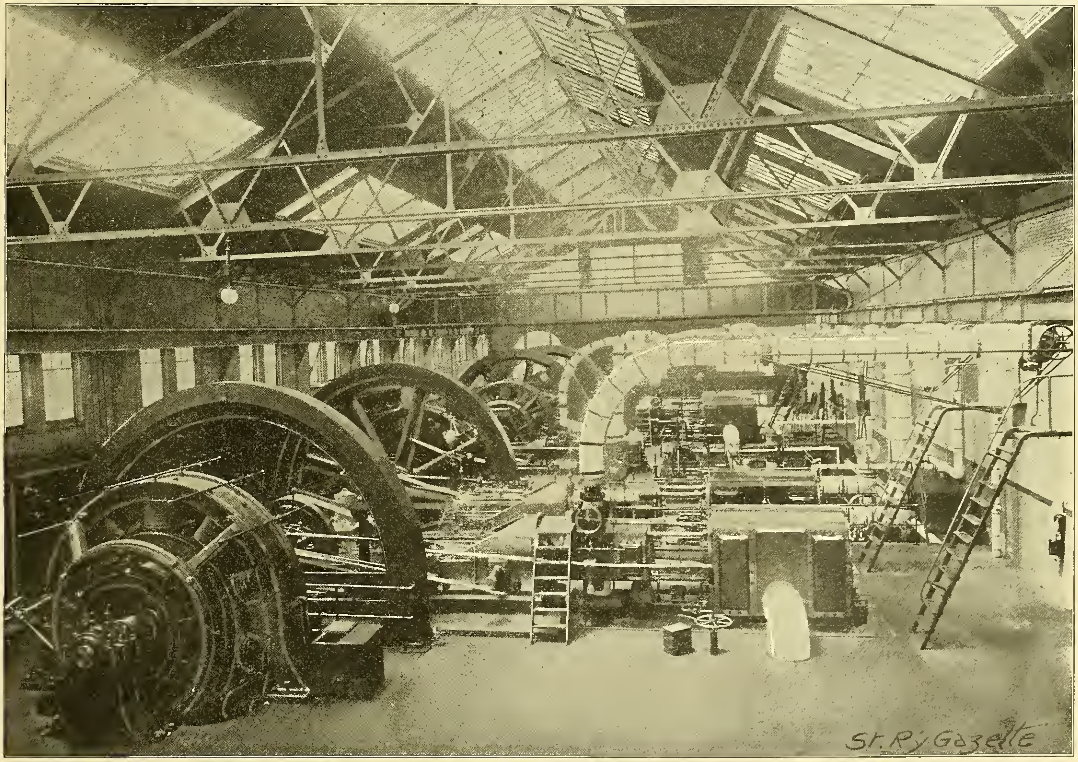


FIG. 1.—ENGINE AND GENERATOR.

The boiler room, Fig. 3, the dimensions of which are 200 by 80 feet, has a capacity for 12 batteries of two boilers each, arranged six on each side and extending the entire length of the room. At the present time the equipment of boilers on one side of the room is complete and three batteries have been installed on the other side. The 18 boilers now in use are of 250-hp each, and were made by the Babcock & Wilcox Company. Mechanical draft is produced during the hours of heavy load by two Sturtevant 14-foot fans, working at from 35 to 50 revolutions per minute, each of a capacity of 300,000 feet per minute. Each of the fans has a capacity sufficient to run the plant. Power is supplied by a Sturtevant horizontal balanced slide valve engine to the shaft of which the fans are directly connected. The stack, which is of steel plate with brick lining, has an inside diameter of ten feet, and rises to a height of 61 feet above the floor of the engine room, and is located directly above the fan house. One of the most interesting features of the station is the mechanical system for handling the coal and ashes. It is regarded with no little favor by the companies, as its operation has been instrumental in keeping down the expenses of the station. Coal is brought to the station on a spur track from the Philadelphia & Reading Railway. It is delivered on dumping cars running on a level with the floor and is deposited in a vault. The coal passes by chutes to a Dodge chain conveyor extending parallel with the vault, for a distance of 61 feet, by means of which it is carried to a screw conveyor. The latter delivers the fuel into an elevator which takes it to a chain conveyor 184 feet in length, by which the coal is carried to two steel hoppers, each of a capacity of 80 tons, suspended from the roof trusses. The coal is delivered as required from the hoppers to the floor in front of the boilers, by spouts with swivel gates.

The system by which the ashes are removed is fully as complete. As the ashes are drawn from the pits they fall into a trench, in front of the boilers, containing a heavy screw conveyor, by which they are carried to an ash elevator, shown at the right in Fig. 3, in the centre of the room, and thence to a screw conveyor which delivers them to a pocket, so arranged outside the station that cars may be run under it. The power for operating the coal and ash handling machinery is supplied by a 35-hp Westinghouse Junior engine. The system was installed by the Link Belt Engineering Company.

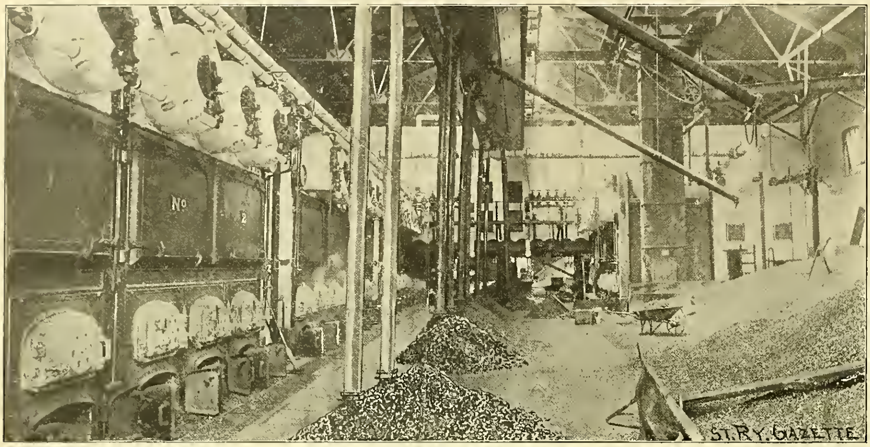


FIG. 3—BOILER ROOM.

The arrangement of the steam piping throughout the station is very complete. The boilers are connected to an 18-inch steam main, which extends the full length of the side of the boiler room nearest the engine room, in such a way that any boiler can be shut off. The engine supply pipes run directly from the main and by an arrangement of the valves, steam can be delivered to any engine from any boiler or set of boilers. The main steam pipe is of charcoal iron riveted to welded steel flanges. Extra heavy cast steel fittings are employed on the steam main and a gate valve is located in the centre so that in case of accident one half of the main can be shut off leaving one half of the plant in operation. The main was supplied by the Latrobe Steel Company. The station is equipped with an American economizer which is located in the centre of the boiler room and extends the entire width. It is constructed in four sections, and one half of the boilers on each side of the room discharge into one of the sections. Each section is provided with a damper, so that it may be shut out and the gases passed directly to the stack, if desired. Each section of the economizer has a cubic capacity of 33,600 pounds, and is constructed of 560 pipes giving a heating surface of 6,440 square feet. The pipes are arranged in sections of ten each. There are 56 sections, the first 13 being connected in series and the remainder in parallel. The temperature of the feed water is raised from an average of 130 or 135 degrees to 200 or 210 degrees. The gases from the boilers enter the economizer at about 400 degrees and leave it at a temperature of 160 to 170 degrees.

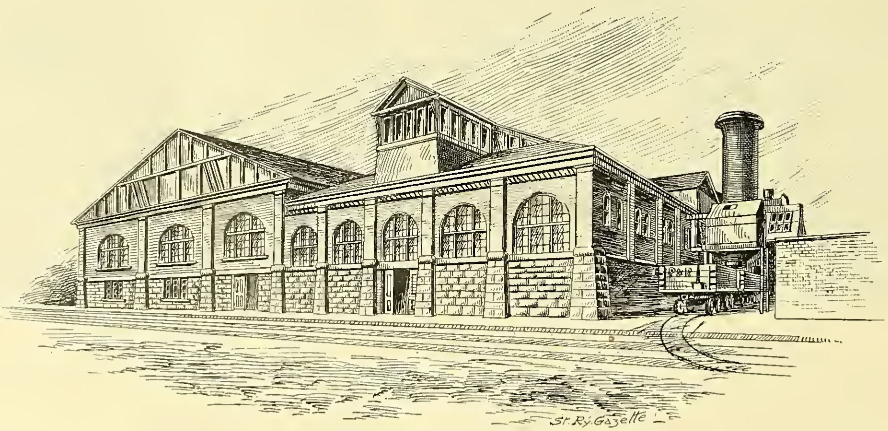


FIG. 2.—POWER STATION.

The engine and generator room which is located in one bay of the building is equipped with four tandem compound condensing engines of 1,200-hp each and one engine of the same type of 350-hp. They are of the Porter-Allen type and were built by the Southwark Foundry & Machine Company, of Philadelphia. The high-pressure cylinders are bolted to the hood and end of the bedplate, and the low-pressure cylinder rests on a separate bedplate and is secured to the high-pressure cylinder by heavy stay rods. The cylinder dimensions of the large engines are 24 and 46 inches in diameter, with 42-inch stroke. The space between the high-pressure and low-pressure cylinders is sufficient to permit the removal of the high-pressure piston for purposes of inspection without disturbing either cylinder.

The main bedplate is extra heavy, and consists of a single casting with a broad face which presents a large bearing surface to the entire length of the masonry foundations. The governor and the brackets supporting the main valve gear are rigidly attached to this bedplate, thus securing the governing parts to one main support.

The engine fly wheels weigh 60,000 pounds, and are mounted on a shaft 20 inches in diameter at the hub. The connecting rods have solid crank ends, and strap cross-head ends. The cranks are of the disc type with polished rim. The crank pins are 11 inches in diameter and 9 inches long, and the cross-head pins are 9½ inches by 7 inches. The engines are run at a normal speed of 120 revolutions per minute.

The smaller engine is of the same type with cylinders measuring 14½ inches and 26 inches with 24-inch stroke. The fly wheel weighs 25,000 pounds, and the engine is run at a speed of 200 revolutions.

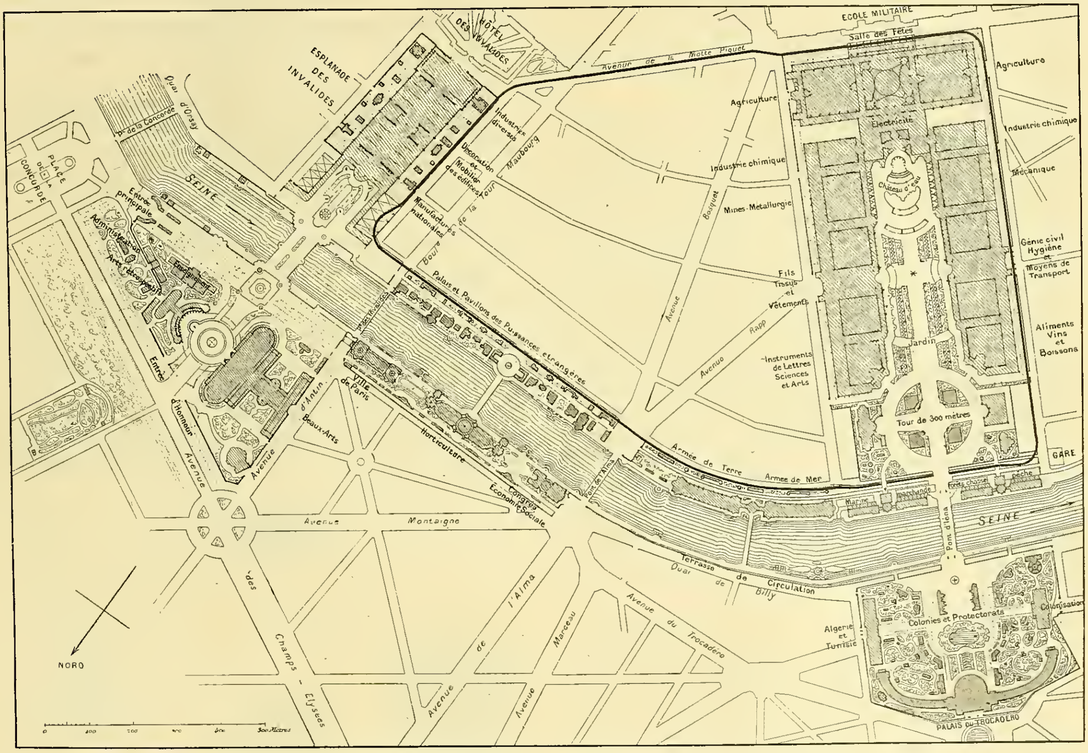
(To be continued.)

Conductor's Authority Sustained.

Judge Tighe, of Brooklyn, has dismissed the complaint against Joseph Parrish, a street railway conductor, charged with assaulting a passenger. The evidence showed that the latter was guilty of using profane language in a car. The conductor started to eject him and struck him in self-defense.

Transportation at the Paris Exposition of 1900.

In preparing for the Paris Exposition of 1900, the officials have not lost sight of the necessity of making adequate provision for the transportation of visitors. From their experience in the World's Fair in 1889 they have realized that improvement in the transport service is urgently demanded. The facilities at that time were far too limited; in fact some of the writers, who have recently pointed out the necessity of better railway service, assert that the means of transportation were dangerously insufficient. The plan of the exposition which has just been adopted, giving the general arrangement of the grounds, provides for the construction of an electric belt line. Its location is shown by the dark line in the accompanying map. Little has been decided upon at the present time in reference to the road. It will be about two and one half miles in length with stations at the more important points. For a part of the distance it will be elevated and for the remainder it will be built at grades.



GENERAL PLAN OF PARIS EXPOSITION OF 1900 SHOWING ROUTE OF ELECTRIC BELT LINE.

As it was stated in an article on the subject, in the Street Railway Gazette of April 27, the directors of the exposition are now working out plans for the increase in the facilities for carrying the visitors to the grounds. New street railway lines will probably be built, and these undoubtedly will be operated electrically. They will not extend to the gate of the exhibition, but will be stopped some distance from it, to avoid inconvenient crowding. The number of boats on the Seine will be increased considerably; they afford always a popular and generally an agreeable means of going to and leaving the exhibition grounds. Lastly, it is expected that, though the project for a general underground railway has been abandoned, certain lines will be extended as near as possible to the exhibition. A new railway, it is expected, will be made, joining the Chemin de Fer du Ceinture with the Champ de Mars; another will extend to the Esplanade des Invalides; and probably this will be extended as far as the Luxembourg station of the new underground line of the Paris & Orleans Company, and it is possible that the two stations on the east of Paris will be connected—the termini of the Paris & Orleans and the Paris, Lyons & Mediterranee railways. It is also intended to construct, down on the right bank of the Seine, chiefly beneath the Rue de Rivoli, a tubular railway, presumably at a low level.

The officials are preparing for an extensive electrical exhibit which they intend to make one of the great attractions of the exposition. The electrical palace is to be constructed principally of glass, and provision is to be made for brilliant illuminations at night. The present Machinery Building is to remain, but is to be greatly enlarged.

Reorganization of the Milwaukee Street Railway Company.

The following gentlemen have been appointed a committee to reorganize the Milwaukee Street Railway Company for which receivers were recently appointed: Frederic P. Olcott, Arnold Marcus, William Nelson Cromwell and Charles W. Wetmore. The appointment is made under an agreement assented to by the holders of a large majority of the securities of the company. The depository under the reorganization plan is the Central Trust Company of New York City. The reorganized company will have $7,000,000 of first consolidated 5 per cent. mortgage bonds and $7,000,000 capital stock, of which $3,500,000, will be 5 per cent. preferred and the remainder common stock. The new mortgage will cover all the properties of the Milwaukee Street Railway Company with the exception of some real estate not used by the company, the proceeds of which, when sold, will, under certain restrictions, be used for betterments and improvements. The company is authorized to increase its preferred capital stock and its first consolidated mortgage to the amount of $1,000,000 each for additions to and extensions of the plant.

Of the $7,000,000 first consolidated mortgage bonds to be issued, $1,500,000 will be retained by the trustee to redeem an equal amount of underlying first mortgages, and the remaining $5,500,000 will be divided pro rata among the present first consolidated mortgage bonds, under which division those bonds will receive 61.756 per cent. in new bonds. Of the preferred stock, the present outstanding first consolidated mortgage bonds will receive 38.244 per cent. of their par value and of the remaining preferred stock the outstanding unfunded coupons of this mortgage, to the amount of about $40,000, will receive an equal amount at par. The unpaid coupons on outstanding first consolidated mortgage bonds will receive 61.756 per cent. in cash. Of the $3,500,000 common stock to be issued, $2,550,000 will be given in exchange for $1,275,000 of consolidated mortgage bonds of the present company. The remaining $950,000 of common stock is to be divided pro rata between the stockholders of the present company, who thereby receive 20 2-10 per cent. of the par value of their present holdings in new stock.

Some Practical Notes for Motormen—III.

BY GEORGE T. HANCHETT.

Some Electric Phenomena.

Those who have read the first chapter on this subject, and have not had occasion heretofore to study the matter, have doubtless reasoned within themselves, "I have obtained an idea as to how the current flows, what causes it to flow, and the resistances it encounters, but how does all this drive the motor? The inside of a railway motor is full of bobbins of wire, some moving and some stationary, and I presume the current traverses these, but how does it produce the rotation?"

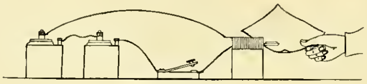


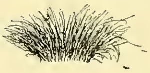
FIG. 4.

The aim of this chapter is to describe and partially explain some phenomena that apply to this, so that the subsequent discussion of the matter will be easy. Such phenomena as do not directly apply to the object of this series, will be strictly avoided.

The first thing that catches the eye when a railway motor is opened are the coils of wire. It is fair to assume that they are not put there for ornament, and that electric currents go through them, and, therefore, it would be wise to investigate just what the effect of coils of wire carrying currents is.

To this end procure two magnets and two or more salammoniac batteries from a dealer in electrical supplies, also some 20 or 30 feet of No. 20 B. & S. single cotton covered wire. Couple one of the carbons and zincs of the cells together by a short piece of wire and use the other two as a source of current (see Fig. 4). Do not keep the current on longer than necessary.

Coil the 20 feet of wire around a lead pencil, forming an evenly wound bobbin. Remove this bobbin from the pencil and connect the two ends to the terminals of a battery, interposing in the circuit a key as shown in Fig. 4. Support the bobbin in a horizontal position, and upon a piece of paper bring to one end of the bobbin a common steel pen and close the key. The pen is instantly drawn into the bobbin. Hold the bobbin in a vertical position keeping the circuit closed. The pen is supported in the centre of the coil by some unseen force. Break the circuit by opening the key. The pen falls out of the bobbin.



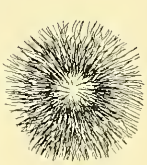


FIG. 5.

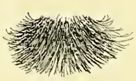


FIG. 6.

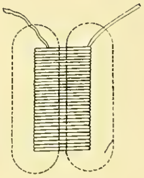


FIG. 7.

We see from this experiment that the coil of wire possesses actual mechanical power, which power is under perfect control by opening and closing the circuit of the coil.

To investigate this matter a little further, place a piece of paper over the top of the coil when in a vertical position, and closing the circuit, sprinkle the paper with iron filings. The filings arrange themselves in a very peculiar manner, shown in Fig. 5. Repeat the experiment, laying the paper on the side rather than the end of the coil. The arrangement shown in Fig. 6 is produced.

Now these filings would not have taken up their peculiar position if some force had not directed them there. If we should immerse the coil in glycerine, in which were iron filings in suspension, we should find that these lines of force are not confined to one plane, but spray out from the ends of the coil like the heads of a sheaf of wheat.

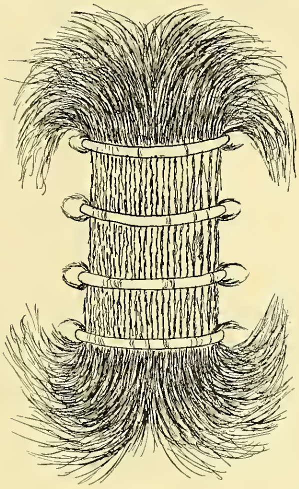


FIG. 8.

The filings somewhat imperfectly arrange themselves along what are called magnetic lines of force. For convenience in calculation, these lines are assumed to exist and their number per square inch, as they issue from the end of the coil or electromagnet, as we may now call it, is a measure of its strength. The theoretical number of lines is far greater than is shown by the crude method of filings.

But we notice that all bobbins used on street car motors have an iron instead of an air core. In order to investigate the value of these iron cores, slip an iron core into the bobbin you have made, using soft iron wires of even length. Test the strength of the magnet with the iron filings on the paper, and you will find it several hundred per cent. stronger. Now we have no more current from our battery and, therefore, by this means we obtain a very much stronger magnet for the same power. Hence the economy of the iron core is at once seen.

In order to further pursue our study of magnets, we must obtain a better conception of what magnetic line of force is, and some of the properties of the materials that conduct it.

A magnetic line of force is supposed to form a completely closed loop, and, in the case of our bobbin, starts from the inside, issues from the end, and returns on the outside, as shown in Fig. 7. The reason our filings did not show this is due to the fact that it required many lines of force to arrange one line of filings, and as these lines issued from the coil, they spread out like water from a spray nozzle, the result being that on the sides of the coil where the lines shown by the filings appear to fade away, is very weak in true magnetic lines and unable to establish rows of filings. Just as many lines are there, but they are distributed over a large area, and, therefore, more thinly. Fig. 8 gives a good idea as to how magnetic lines of force are propagated. It may be reproduced by coiling a heavy copper wire through holes in a sheet of paper, passing a very strong current through the wire and sprinkling with iron filings.

Now, if lines of magnetic force form completely closed circuits, and as we have seen, flow in greater numbers through an iron path when using the same magnetizing energy, or magnetomotive force, as it is called, it might be well to provide an iron path all the way around the circuit in order to obtain the strongest magnetic effect. The following experiment will show the truth of this supposition: Remove the flat strap from one of the bell magnets and mount the two bobbins on a vertical board, as shown in Fig. 9. Over these, hang by the elastic band *d*, the rear strap of the other magnet, allowing the other end to rest on a nail *x*, while the nail *y* prevents it from slipping in the direction of its length. Attach a pointer *w* to the movable iron strip and provide a paper scale over which it may travel. The pointer may be a straw or light wire fastened by wax. Now energize the coils with the current from the two coils, and note that the pointer is deflected downward. The magnetic circuit here is indicated by the dotted line. Let us see if the completion of it makes any difference. Place the iron strip that you removed on the lower ends of the two magnet bobbins. The upper armature is now attracted more than double the distance that it was before, and more probably is drawn down to its limit of motion with a sharp click. Moreover, we shall find both of these strips of iron much more difficult to remove than if either alone would be.

This property of iron to conduct great numbers of magnetic lines with a relatively small magnetomotive force is called permeability. All substances have a permeability, but that of most of them is the same as that of air and is expressed by unity. The permeability of iron varies very much with its quality and the magnetomotive force to which it is subjected. On account of its great permeability, soft steel is largely used in the construction of railway motors.

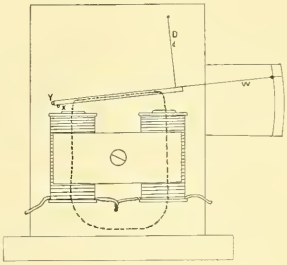


FIG. 9.

The name circuit, which has so often been used in this brief discussion of magnetism, suggests at once the idea that perhaps a magnetic line of force has a direction as well as an electric current. Experiment is perhaps the best way of proving this. Take a single bobbin of one of the bell magnets and energize it from the battery. Our conception of lines of force tells us that a tuft of them is issuing from the ends of the iron core of this magnet and spread out, and taking curved paths through the air, return into the opposite end to that from which they issue, forming closed loops.

Now, we cannot conceive of a force without a direction, and, therefore, if our conception that these lines of force which we have caught a rude glimpse of by means of our filings are really lines of stress, there must be a *difference* between the ends of this magnet, as in the one case the lines are proceeding from, and in the other case are entering the end of the magnet. If there is a difference between these ends, they must be capable of producing different phenomena, and if we find such to be the case, we may consider the conception sufficiently proven for our purpose, if, indeed, it is not absolutely proven.

Present one of the ends of this magnet to a pocket compass. One of the ends of this compass is attracted and you will find that it is impossible to attract the other end in this way; it is, in fact, positively repelled. If we change ends with our magnet, the compass needle promptly changes ends when we strive to repeat the experiment. There is then a difference whether the magnetic lines of force enter or leave the magnet, and this difference the compass has detected, and, as we shall find later, other things are capable of detecting it also.

(To be continued.)

Testing the Value of Fenders.

Superintendent Vining, of the Market Street Railway Company, of San Francisco, recently undertook to demonstrate to the satisfaction of the Board of Supervisors that it was practically useless to pass an ordinance compelling the railway companies operating street car lines in the city to put life-saving fenders on their cars, because, in his opinion, no efficient life-saving fenders have been invented. The San Francisco *Examiner* states that for the purpose of demonstration, two of the single-truck cars of the Mission Street line were fitted with fenders made of wire nets that scooped down close to the rails, which it was intended would pick up a body before the wheels could mangle it. On one of the cars the net was attached to the end of the pilot beams, and it stuck out about two feet in front of the car. It was about seven inches up from the rails, and the railway men present said the fender could not be placed lower and clear the roadway when approaching some of the grades on the line.

The fender on the other car was attached to the truck and quite close to the wheels. It was only one inch and a half above the rails. This style of life-saving fender was recommended by Superintendent Vining as the most practical of any of the devices yet submitted to him for inspection, and if not successful he implied that it was useless to legislate in the matter.

The tests were failures as far as demonstrating that the fenders were life-saving devices, but the railway superintendent was satisfied. The supervisors present, however, thought that if Mr. Vining's device did not work satisfactorily, others would, and they expressed themselves as all the more determined to compel the street railway managers to have the cars provided with the most practical life-saving guards that ingenuity can devise.

The first test made was with the car with the guard in front. A dummy about the weight of an ordinary sized man was placed in an upright position between the tracks on West Mission Street, and the car run at it, at a speed of about six miles an hour. The dummy was hurled about ten feet through the air and thrown flat on the roadway in front of the car. Just as the fender touched it the second time the motorman brought the car to a stop. The dummy was then placed flat across the rails and again the car ran at it. The fender rolled the dummy over about half way, then passed over the top of it. The bundle of stuffed clothing was taken out from under the wheels. Mr. Vining's fender, in front of a single-truck car and seven inches from the rails, was more harmful than useful.

Then the car with the fender in front of the truck and back under the platform was tried. Any one standing on the tracks would have received a blow from the bumpers sufficient to have killed him before the overhanging platform of the car would have passed over him and allowed the fender to operate. The guard fastened to the trucks was only an inch and a half from the rails, and it picked up two of the dummies placed across the track, while it shoved a third along the ground some distance, when the car was stopped. All of the dummies were so roughly used by the fender that arms or legs were torn from them.

Richmond Underground Conduit Railway.

The Common Council of Richmond, Va., has passed the ordinance granting a franchise to the Richmond Conduit Company for an underground electric railway from Chimborazo Park to the Boulevard on Broad Street. The Richmond Conduit Company, in order to carry out the provisions of the ordinance, will deposit a forfeit inside of 30 days of $10,000 for a proper performance of the contract, and as soon as it commences the work an additional $50,000 to secure the city against all liabilities and damages to streets on account of the construction. The work is to be begun in 90 days and completed in nine months.

Rumor of a Strike in Boston.

A strike of the floormen and other workmen employed in the car-barns of the West End Street Railway Company of Boston was threatened last week. The men had presented to the management a petition for increased pay and the introduction of several changes in respect to hours of labor, and when the refusal of the latter to make the concession was read at a meeting of the Union, a motion to strike was made, but was postponed at the request of one of the Union officers, who urged that another attempt to secure a settlement by peaceable methods be attempted. The men complained that their wages were too small; that they were compelled to perform unnecessary work on Sundays, and that their condition might be materially improved in other respects. The company, after making an investigation of the complaints, found that the grievances were not well founded. The men subsequently appealed to the State Board of Arbitration to investigate the matter, but the company refused to join in the request for arbitration.

An order which has just been issued by the West End road relating to the carrying of mail pouches seems to have caused considerable excitement among the motormen, but the report that a strike was contemplated does not seem to be well founded. The order provided that mail pouches should be carried on the front platforms of cars and should be in the charge of motormen during the trip. Some of the men seemed to think that this provision made them unwillingly mail agents, and in this capacity it would be dangerous for them to strike if they wished.

H. M. Littell.

Mr. H. M. Littell, general manager of the New Orleans Traction Company, will assume the presidency of the Atlantic Avenue Railway Company, of Brooklyn, N. Y., on July 1. In his new position, Mr. Littell will have charge of the active management of the road. For a little less than three years he has been engaged in successful work in New Orleans. During that time he has held the position of general manager of the New Orleans City & Lake Railway as well as president of the New Orleans Traction Company. A short time previous to his accepting these positions, all the prominent street railways of New Orleans, with three or four exceptions, had passed into the control of the Traction Company. It was at once decided to convert all the lines into electric roads. At that time New Orleans had only one electric line, and those who were heavily interested in the Traction Company decided that it was necessary to secure a man of wide experience and demonstrated ability to assume the management while this important work was in progress. The selection fell upon Mr. Littell and immediately upon his arrival the work was commenced with great vigor, and within two years and a half nine lines, with 120 miles of track, have been electrically equipped. By July 1, or soon after, all the lines of the Traction Company will be completed and will be traversed by electric motor cars.

H. M. LITTELL.

When asked recently in regard to the reasons which had influenced him to leave New Orleans, Mr. Littell stated that he had determined to resign solely because he had received an advantageous offer from Brooklyn. Any rumors of differences between himself and the Board of Directors of the Traction Company, he said, were utterly without foundation. He had gone to New Orleans, he said, for the purpose of equipping the lines before July 1, 1895, and that work was now accomplished. He also made the statement that the Crescent City was now possessed of the finest electric railway system in the United States, the most modern cars, the heaviest and smoothest roadbed and the best equipment. Mr. Littell will have a position of great responsibility to fill in Brooklyn, especially as he is to be the successor of so successful a street railway manager as Mr. Benjamin Norton, whose resignation has just gone into effect. Few men in the country can be found better qualified, however, to manage and advance the interests of this great property.

Gettysburg Condemnation Proceedings.

Proceedings have been instituted to condemn two strips of land belonging to the Gettysburg Electric Railway Company which are wanted by the government as an addition to the Gettysburg Battlefield Park. Last week, in Philadelphia, District-Attorney Hingham filed a petition asking that a jury be appointed to determine the fair value of the property in question so that it might be taken by the United States for the purpose mentioned. The judgment in the condemnation proceedings that were once before instituted was set aside by the United States Supreme Court on the ground that no authority had been given by Congress for the condemnation of the land. In the present case the proceedings are instituted under the National Park Military Act approved by Congress in February last.

Death of Johns Hopkins.

Mr. Johns Hopkins, president of the Hestonville, Mantua & Fairmount Passenger Railway Company, of Philadelphia, Pa., died at his home in that city on June 7. While he had been complaining of ill-health for several months, his death was wholly unexpected. On Decoration Day, while in Baltimore, he rode a considerable distance on a bicycle and the exertion almost prostrated him. On his return to Philadelphia he resumed his business duties until Wednesday of last week, when he was ordered by his physician not to leave his bed. He was suffering from nervous prostration, and while his condition was regarded as serious it was confidently hoped that rest and quiet would restore him. About 6 o'clock Friday evening Mr. Hopkins' nurse left the room a moment, and in his absence Mr. Hopkins attempted to get out of bed. He was seized with a hemorrhage of the brain, which caused him to fall, or else he fell from weakness, and the shock caused the hemorrhage. The nurse, hearing the fall, returned to the room instantly, but all efforts to revive Mr. Hopkins were in vain, and he died in a few minutes.

Mr. Hopkins was related to the well-known Hopkins family of Baltimore. He was born in that city in 1860, and was a cousin of the late Johns Hopkins whose munificence established the university that bears his name. He began his business life in Baltimore as clerk in a hardware store. Subsequently, he organized the Johns Hopkins Oil Company and became its president.

In 1884 he made Philadelphia his home and established there a branch of the company. He was also vice-president of the Huntingdon & Broad Top Mountain and Coal Company, and a director of the Security Trust Company, and was connected with other organizations in Philadelphia and Baltimore. In January, 1893, at the time the present management obtained control of the Hestonville, Mantua & Fairmount Passenger Railway Company, he was elected president and had been active in the successful management of that company. The funeral took place last Monday afternoon at Holy Trinity Church in Philadelphia.

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Established January 1, 1886.

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SECOND HONOR NOT FOR RICHMOND.

Richmond holds an honorable place in the street railway world as the city in which the commercial success of the modern electric railway was first effectively demonstrated. The latest news from that city is to the effect that it is to have an electric line worked by underground conductors within the next few months; but it is not reserved for Richmond, we believe, to grasp this second honor in the railway field. Before this line can be in successful working operation, New York and Washington will have claimed the distinction. Perhaps, indeed, the honor already belongs to New York, as the Lenox Avenue electric conduit road in that city is now operating so successfully that it fails to attract the share of public attention that rightfully should belong to it.

WASHINGTON FENDER CASES.

The prosecutions under the fender regulation in Washington have come to naught, and the cases have probably been finally disposed of. The companies have been granted additional time in which to equip their cars with approved life guards, and as they express their willingness to hasten the work, as far as possible, they will probably be able to comply with the law before the expiration. The action of the court was as just as it was satisfactory to the companies. Under the law the cars were to be provided with fenders by June 1, but a combination of circumstances made it impossible for the companies to conform to the regulation. Had the court been disposed to be less fair, the penalty would have been severe. The law provided a fine of $25 for each day a car was operated without a fender, and on the day of the trial the companies would have been obliged to pay about $25,000 had they been mulcted of the full amount. Fortunately, the court did not see fit to punish the companies for failing to do the impossible, and the cases will probably be allowed to drop.

FREE EXCURSIONS ON STREET RAILWAYS.

The popularity of the so-called trolley party has demonstrated the fact that the possibilities of the electric car as a pleasure vehicle are not unappreciated by the public. It is questionable if the public derives as large returns in the form of enjoyment from any equally small investment of money as from that paid for riding in the open cars during the summer months. On the warmest days a comfortable place can always be discovered in the summer car. Street railway companies are certainly following a wise policy in adopting plans calculated to make riding of this kind as enjoyable as possible. The fare, small as it is, unfortunately keeps many poor persons from enjoying an outing on rapidly moving cars in the suburban districts away from the oppressive heat and uncomfortable surroundings of tenement districts, and to provide for them free excursions on electric cars during the summer months, is, indeed, a worthy charity. Outings of this kind have been provided in many cities without cost to those who have enjoyed them, but in Springfield an arrangement has been made for weekly excursions which mothers with sickly children will be invited to enjoy free of all expense. Special cars are to be provided in charge of picked men to care for the passengers. The plan should work admirably and should confer the greatest physical benefit on those who enjoy the excursions; while those who are providing the necessary means will gain their reward in a realizing sense of the good they have been able to accomplish. The plan is worthy of general imitation Street railway men, unless we utterly mistake them, will heartily co-operate in making such plans successful as well as easy to undertake.

TRANSPORTATION DEVELOPMENT.

A brief history of the transportation system in the city of St. Paul, which has recently reached us, illustrates in a striking way the wonderful development of the street railway in that city during the last few years. For less than a quarter of a century this one of the Twin Cities has been provided with facilities of this kind. It was in 1872 that the entire population turned out to witness the operation of the first street car, which was a bob-tail vehicle drawn by a single horse. It was deemed, however, a great privilege by the citizens of St. Paul to be enabled to ride a distance of three miles for the nominal sum of 5 cents, and the fare was cheerfully paid in those days. During the next ten years the development of the system was not rapid, and in 1882 the cars traversed only 12 miles of streets, but wonders have been worked since that time. The mileage is now ten times as great and it forms part of a network of 235 miles, uniting all parts of St. Paul and Minneapolis. The rolling stock is as good as can be built and the facilities are in every respect ample and admirable. And now we learn that the very men who esteemed so highly the privilege of paying 5 cents for a possible ride of three miles, feel deeply aggrieved because they are not now allowed to travel over all St. Paul and Minneapolis for the original fare. The development has certainly been remarkable and the growth has proceeded at a rate more rapid even than that of the enterprising city in which it is located. This is but one illustration of the development of street railway systems, and perhaps it is not the most striking which could have been selected. The evolution has certainly been just as remarkable in Philadelphia and a local paper says, in respect to it: "There never was any such transformation wrought in any city as has been made in Philadelphia by the introduction of the electric railways. It is but the other day that we were discussing whether we would have them or not, and already the period of the horse cars seems as antique and remote as the period of the stage coach. The transformation that has been made in travel in and about the city seems marvelous." Chicago is characteristically preparing to claim the largest electric mileage in the world, and no less than a score of cities like Boston, St. Louis and New Orleans would be disgruntled were their claims to the ownership of the finest street railway system in the world questioned for a moment. The change has certainly been nothing short of marvelous, and within a comparatively brief period we shall doubtless see equal wonders worked in the equipment of suburban roads now traversed by steam locomotives.

Petition to Parallel Existing Lines Denied.

In a recent decision the General Term of the Supreme Court of New York affirms the action of the New York Board of Railway Commissioners in refusing a certificate allowing the Amsterdam, Johnstown & Gloversville Railway Company to build a 14-mile extension which would, at different points, parallel the lines of the New York Central and Fonda, Johnstown & Gloversville steam roads and the Cayadutta Electric Railway. The railway commissioners refused to certify that the proposed extension was a public necessity or convenience, on the ground that the existing provision for transportation was sufficient. An appeal was then taken to the courts. An abstract of the decision, which was delivered by Judge Herrick, is presented herewith: "Unless the court can see that the decision of the Board of Railway Commissioners was founded upon erroneous legal principles, or that it proceeded contrary to the clear weight of evidence in arriving at its conclusion upon any question of fact, or that it has abused the discretion vested in it, and has arbitrarily refused to issue the necessary certificate, I do not think the court should reverse its determination, and compel it to issue a certificate. Petitions for and against the new road were presented signed by hundreds of people, but no facts were given except the general statement that transportation charges on the existing railways were too high. Local sentiment aroused by the alleged misuse or abuse of an existing franchise affords no sufficient reason for granting another franchise. There is no evidence that the existing railways could not carry all the freight and passengers. . . . The privilege of constructing and operating a railway is not one that exists in the incorporators as a common right, it is a privilege or franchise that is granted by the state, and can only be obtained by complying with the laws adopted by the state regulating the granting of such franchises. The law, section 59, was evidently intended to restrict the building of roads not actually needed, in order to protect not only existing railways but also citizens from investing in alluring but profitless enterprises.

"Provisions had theretofore been made, to be hereafter referred to, for the correction of abuses in the management of roads already constructed so that it was no longer necessary to correct evils in the management of existing roads by constructing a competing one. A corporation applying for a certificate is not entitled to it as a matter of right in the event of no one appearing to oppose its application; nor if any one does appear in opposition, is he obliged to prove a negative, and convince the board that public convenience and necessity do not require the construction of the road. The burden of proof is upon the applicant to establish the existence of that condition of affairs which will authorize the granting of a franchise. . . . To guide them, where it is claimed existing roads do not afford the necessary facilities, the commissioners may properly take into consideration the means that the law affords to regulate the management of railway corporations, and correct mismanagement and enforce the providing of proper service. . . . The commissioners were abundantly justified in finding that the road was not needed and they have not abused their discretion. The claim was made that the principal company now serving this territory has recently declared a dividend of 8 per cent. and has a surplus in its treasury. Without inquiring into the truth of such claims, nor for how long a time the existing company has been running and declaring dividends upon its stock; or whether the original investors have from the time of the commencement of their road down to the present time received reasonable returns for their investments, but, for the purposes of this case, assuming that their charges are under all the circumstances unreasonable, that was not a sufficient reason for certifying that public convenience and necessity required the construction of the road. The charging of exorbitant rates does not, in the present state of the law, make a case for the building of another road. Such charges may indicate either that there is insufficient business to support the roads with lesser charges, or it may indicate bad management and a grasping disposition on the part of their operators.

''The remedy for high charges is to apply for a reduction of rates. Section 161, chapter 565, laws of 1890, authorizes the railway commissioners to examine rates for freight and passengers, and if they deem a change reasonable and expedient to notify the railway company to that effect; if the road refuses, the commissioners are to certify the fact to the Attorney General; and section 162, amended in 1892, provides that a special term of the Supreme Court may compel compliance with the recommendations of the commissioners, subject to appeal to the General Term and to the Court of Appeals.. These provisions afford a sufficient remedy for the alleged grievance in the present case. The court must assume that the railway commission will do its duty in the premises, and upon its being made to appear to it, that the existing railways are charging unnecessarily high rates for transportation, that it will recommend their reduction. And it must also be assumed that the Attorney General will do his duty, and present the board's recommendation to the court, in the event of the railways refusing to comply with it; and upon its being so presented, the court will endeavor to do its duty in the premises The application is denied with costs.''

Washington Fender Cases.

The officers of four street railway companies of Washington, D. C., were arraigned in the police court in that city, on Wednesday last, on the charge of failing to equip their cars with fenders, in accordance with the terms of the District regulation. This measure was promulgated by the District Commissioners, in January last, as Congress had approved an act to that effect in the preceding August. When the regulation was made the street railway companies were ordered to have fenders on their cars within 60 days. Then the time was extended to June 1, at which time the four companies had not equipped their cars. Warrants against the presidents were issued daily, and as the regulation provided a fine of $25 for each car each day, a conviction in all of the cases would have netted about $25,000 in fines, or $2,500 a day.

The officers of the roads pleaded not guilty and stated to the court the causes which had prevented them from complying with the regulation. President Dunlop said he had given a contract for fenders as soon as the commissioners had selected a design, and that no human power could have completed the fenders within the time specified or for six weeks yet to come.

President Cummings, of the Brightwood road, testified that the burning of the car sheds and shops of his company, the last week in January, had destroyed nearly half of his cars and a number of fenders which had been made, and that the new cars had been so slow in arriving that fenders could not be made for them.

President Baker testified that his company had placed cable cars on the road during the fender agitation and had equipped them with wheel guards which the commissioners had not finally decided until this month were not acceptable. On account of this delay of the commissioners his company had not had time to provide new fenders.

It was stated, on behalf of the Tennallytown Company, that it had been unable to secure fenders from the manufacturers.

The court decided to allow the companies extensions of time in which to equip their cars, as follows: Columbia Company, three weeks; Washington & Georgetown Company, six weeks; Brightwood Company, 30 days; and Georgetown & Tennallytown Company, 10 days.

Freight Service on Electric Railways.

Appleton Morgan, in a recent communication to the *Railway Age*, refers to freight service on electric railways. He believes that the competition with steam roads will be active. He adds:

''This is to be done, I am assured, by seeking for freight business with an independence of time-tables and obviation of terminal handling and charges other than the railway charges. For example, the trolleys propose, by a system of portable tracks, to enable themselves at any hour of the day or night to run up to the shippers' places of business, to lay down their temporary tracks into his yard or up to his door, and load and resume their own tracks, and so get the shippers' products *en route* while the railway is looking out for the contract. It seems to me that this move on the part of the trolleys is to be met by the railway only by a betterment of its freight service; by better time; by better terminal service; by use of its own teaming facilities, and in such other ways as will suggest themselves to the general and traveling freight agents of our railways to load freight at lesser shippers' expenses. At the present moment a very considerable number of trolley interests are moving to get concessions from local municipal authorities or from the courts establishing their rights to run freight trains through the streets of cities and towns and on country roads. Not much progress has been made so far in the States of New York and New Jersey. But the trolley capitalists are persevering and persistent, and I think a word of suggestion to the railways to be on the alert is timely, if not prophetic. There is no reason—as you suggest—why railways cannot place electric service on their suburban lines. (The New York Central, I notice, proposes to do so as to its 'observation' cars on its Niagara Falls spur. And I am inclined to believe that the railways can most effectually meet electric (trolley) competition by the superior accommodations to passengers (in seating comfort, etc., etc.), which there is no reason why they should not supply, while duplicating the electric locomotion of their busy little rivals.''

Comment and Views of Contemporaries.

Ringing Gongs.—The motormen of the trolley cars ought to be instructed by the managers of the roads not to clang the trolley gongs except when there is need for it. Some of the motormen seem to take a devil's delight in frightening horses and in irritating the nerves of people living along the lines of trolley cars.—*Syracuse Evening Herald.*

Street Car Nuisances.—The presence of maudlin drunkards on street cars is a nuisance of the most offensive kind. Here in Milwaukee it is not a frequent occurrence to see men under the influence of liquor on board of the cars, but it is an offense that is tolerated by the conductors, whenever it does occur. The other passengers, more especially the women, are subjected to the objectionable presence of drunkards, though they are clearly entitled to have them removed.—*Milwaukee Sentinel.*

Water for Employees.—Before the roads were trolleyed, there were barrels of water, kept fresh from hydrants, for horses, and buckets of water kept iced for men at the ferries and the bridge. Now there is no water at either point for men to drink. They seem of less account than the horses were. Their sufferings from thirst in this weather are intense. On Friday and Saturday they were buying water from boy peddlers of it. The companies will do well at once to place and keep ice water in abundance at the termini of the roads for the conductors and motormen, for the public indignation at its absence and at their sufferings is acute and increasing.—*Brooklyn Eagle.*

To Prevent Accidents.—In the days of omnibuses and even of horse cars, the streets could be occupied by children with comparative safety, but public interest demands a different system of transit for a great city extending for many miles, and the children must be protected by the city authorities prohibiting them from occupying the streets. Only the pavements of the city belong to children and pedestrians. There they are safe from danger, and the pavements are made for the purpose of securing them against the accidents to which they may be exposed by occupying the highway. There is no middle ground between keeping the children off the streets by the police power of the city, or reducing the cars to the provincial speed of 20 years ago, if we would save children and careless citizens from accident.—*Philadelphia Times.*

To Avoid Accidents.—There have been nearly 100 persons killed by trolley cars in Philadelphia since the introduction of the electric system. The greater number of victims have been children playing in the street, but some adults have also been killed. It would be unreasonable to suppose that any motorman has deliberately killed or maimed any one, but it is undoubtedly true that some of the accidents have been occasioned by carelessness, the car being run at such high speed as to put it beyond the immediate control of the motorman. Such accidents at least can be avoided and a fair degree of speed for surface cars maintained if the cars shall be run at a steady gait. The *Ledger* is also persuaded that a return to the old rule of stopping on the far instead of the near side of the street would not add anything to the dangers of street car travel, and would promote the end in view, namely, the maintenance of a steady, safe rate of speed.—*Philadelphia Public Ledger.*

Steam and Electric Lines.—The keen rivalry in some parts of the country between the trolley lines and the old established railways for suburban passenger business, and the success that the former have, in many instances, obtained at the expense of the latter, really prove very little because of the widely differing conditions under which the two rivals have thus far competed. The electric roads have been at practically no expense whatever for right of way, their taxes have been a mere bagatelle compared with those the steam roads have to pay, and their track and equipment being new, have cost but little for repairs; in a word, the restrictions imposed and the expenses entailed upon the newcomers have only been a tithe of those the old established roads have to bear, and although the public at large has benefited largely, as it should, by the good fortune of the electric roads, yet the dissimilar conditions cannot in the very nature of things always be maintained, and until the two interests are placed on the same footing, as they inevitably must be sooner or later, comparisons between the two motive powers cannot be otherwise than one-sided and misleading. It will be when the consummation that we speak of, is arrived at, that the real decisive battle will be fought, and when that day arrives the best power will surely win.

Speed of Electric Cars.—It may be assumed that the trolley cars have come to stay; that no possible construction of elevated or underground railways will provide rapid transit for more than a small fraction of the people of a city built like Philadelphia, and the only question to be determined is the speed at which cars shall be run on the surface, so as to give a fair degree of protection to human life. An observant rider on the trolley cars will notice that different motormen have different ways of keeping to schedule time. One keeps moving steadily at a somewhat slow rate, the other runs at a high rate of speed for half a block and then shuts off the current, preparatory to slowing up. The time of each may be the same from depot to depot, but one has never run at a greater speed than, say, eight miles an hour; the other has spurted up to 15 or 20. The one has taken good care of the machinery of the trolley company, the other has endangered, if he has not injured it, by cutting out resistances too quickly, so that it is to the interest of the companies to have all their men trained to run their cars at a steady gait, rather than to speed them up for short distances and then run along by the momentum thus gained. To prescribe by law an average rate of speed beyond which cars shall not be run is to give motormen a great deal of latitude as to how they shall run their cars, and to permit them to run at a dangerous rate on parts of the line. On the other hand, to limit the maximum speed to seven or eight miles an hour is an unnecessary limitation on some lines at some places. A speed which might safely be allowed on the long residence blocks uptown, where the view is unobstructed and children seldom play in the street, would be highly dangerous on a line like that of Ridge Avenue, or on some of the streets downtown where there are numerous small streets and swarms of children using the streets as a playground. Something must be left to the discretion of the companies and the discretion of the motormen, but the latter, at least, should be frequently admonished not to speed up their cars beyond a reasonable limit.—*Philadelphia Public Ledger.*

Manhattan Elevated to be Electrically Equipped.

In a dispatch from Pittsburg, Pa., F. K. Hain, general manager of the Manhattan Elevated, in New York, is quoted as saying that the railway is to be electrically equipped by the Westinghouse Company, at an expense of between six and seven million dollars.

Free Excursions.

Arrangements have been made in Springfield, Mass., to furnish free trips on open cars for the benefit of mothers with sick babies. It is proposed to provide two excursions weekly. The Springfield *Republican*, which has made the arrangements for the excursions, says, in reference to the charity: "Not all the mothers in Springfield are so situated that it is possible for them to take an ailing baby to the hills or the sea, and for such the open cars afford a resource of the utmost value. This is where our frequent open cars are a public benefaction. When the homes are oppressive the rapidly moving cars are a resource that is being more and more availed of. But there are some cases where even this mitigation of summer heat is not easily attainable—how many, it is not easy to determine. Even the outlay required for frequent street car rides is a thing to be felt and carefully reckoned with in many homes."

The first free trip was arranged for last Friday afternoon, and the special car provided for the purpose furnished accommodation for 50 persons.

Exhaust Steam Heating.

BY I. H. BABOCK.

The rapid development of electrical industries has involved the construction of many steam power stations of great capacity. The best these stations can do is to utilize about 10 per cent. of the steam generated in creating the required power. The 90 per cent. which escapes through the exhaust pipe represents, to a very large extent, fuel, labor, the wear and tear of apparatus, and cost of management. Several of the more enterprising electrical companies have adopted economical methods whereby this waste product is turned to practical account. They have constructed underground mains for the distribution and sale of their exhaust steam for the heating of all kinds of buildings. This undertaking has proved unequivocally successful. One of the latest to adopt the new method is the Terre Haute (Ind.) Electric Railway Company, Russell B. Harrison, president. It has already had constructed by the American District Steam Company, of Lockport, N. Y., about one mile of mains leading from its boiler station, and is negotiating for the construction of two miles more of mains, to be ready for the commencement of the heating season in October. The Terre Haute Company also does the city and commercial lighting, and thus has a continuous supply of exhaust steam from boilers of 1,200-hp capacity. The Danville (Ill.) Electric Light & Street Railway Company has also commenced the construction of an extensive system of underground steam mains, and will be selling its exhaust steam for heating as soon as as the heating season opens. About the only expense of this added branch of the business is the construction of the steam mains, as these companies already have their boiler stations and other apparatus ready for use.

Missionary Trolley Car.

A party of persons connected with the Passaic Street Mission, in Passaic, N. J., a few days ago, chartered an electric car on the New Jersey Electric Railway, and went by way of Paterson to Singac and back. Wherever they saw a group of people on the sidewalks or rural roadsides the car was stopped, and the evangelists sang hymns and exhorted the bystanders.

Astruck Folding Fender.

The Astruck folding fender, which is illustrated in the accompanying cuts, is so constructed that it is always over the rails, whether it is in position, as shown in Fig. 1, or folded, as in Fig. 4, under the car. The frame or support is provided with flanged pilot wheels which ride on the rails. A central tube is attached rigidly to the fender frame and slides over a tube which is attached pivotally to the pilot board of the car truck. An automatic lock on the frame holds the entire fender in position in front of the dashboard, so that it is not affected by the oscillation of the car, and the wheels are permitted to act freely on the curves and switches as well as on the straight stretches of track.

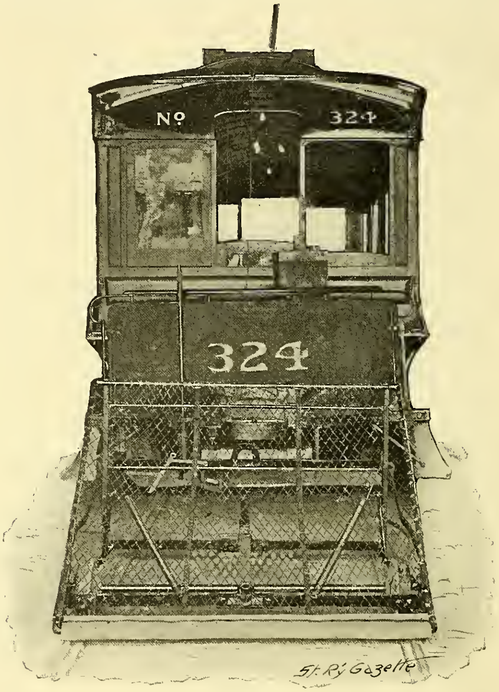

FIG. 1.

The fender, as shown in Fig. 1, is so poised that the cushion buffer at the front clears the rails by two and one half inches; no person, therefore, who is struck can pass under it. It is held in position by springs sufficiently strong to insure safety. When a person comes in contact with the Astruck fender he is struck by the cushion buffer at a point between the heel and the ankle, and naturally falls into the bed which yields under the weight, the fender sliding down at the rear and outward at the front, as shown in Fig. 3, and remaining in this position until the weight is removed, when it automatically resumes its normal position. Its action tends to take up, to a great extent, the shock incident to the fall, and prevents possible injury from coming in contact with the dashboard, coupling pin or bumper.

The fender is made of strong tubing, and netting, concave in the centre, to prevent a person who falls into it from rolling off at the sides, is stretched across the frame. It is braced, to give it additional strength, by two bars of iron, as shown in Fig. 2. The buffer at the front edge of the fender is attached so that the effect of the blow, when a person is struck, is reduced to a minimum. The rear support of the fender acts as a guide on which the rollers slide up and down, and is held in place by braces, which may be locked or unlocked by pushing a lever acting simultaneously on both sides.

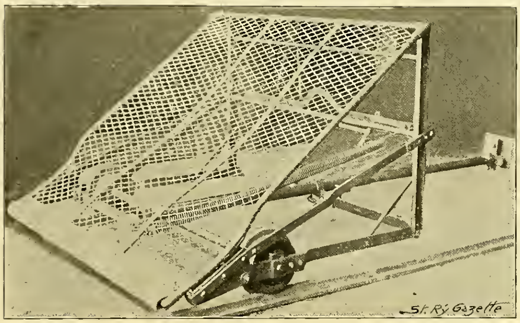

FIG. 2.

When in position, Fig. 1, the fender projects four feet and four inches from the bumper. When folded, Fig. 4, it occupies a space 5 feet 11 inches in length, and 11½ inches in height under the car. Fig. 2 shows the details of the fender, and Fig. 3 represents it in action.

The original model of the Astruck fender which was illustrated and described in the Street Railway Gazette of May 11, was successfully tried for two weeks, during which it was in continual service. At the expiration of this time it was pronounced by the chief engineer of the company to be in as good condition as on the day when it was first used, a fact which would appear to demonstrate its substantial construction. During that time it picked up three persons, it is claimed, while the car was traveling at the rate of eight miles an hour, without injuring or bruising any one of them. The fender which is shown in the cuts is an improved form, but the general principles on which the first model was built are preserved. The inventor claims that types of fenders projecting in front of a car and attached to the dashboard or car body are worse than useless on curves, for the reason that they overlap the track so far on one side that they may strike persons who may think themselves out of danger. At the same time the opposite side of the rail is exposed for the same distance that it is overlapped on the other side. The fender has been examined by a sub-committee of the railway committee of the New York Board of Aldermen, and pronounced meritorious. The inventor is J. H. Astruck, of 41 Maiden Lane, New York.

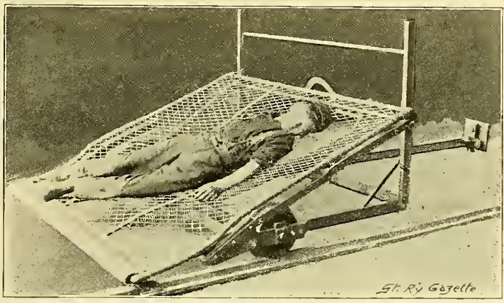

FIG. 3.

Three-Phase Street Railway System.

The General Electric Company will make its first application of the three-phase long-distance system to street railway work at Lowell, Mass., where a plant is being constructed for the Lowell & Suburban Street Railway Company. The special features of the installation will make it one of the most interesting three-phase plants ever constructed. The generators will deliver both alternating and continuous current, and when not in use for transmission work will be run in parallel with the railway generators which are now in the station. They will be wound for low-voltage current at the alternating side and the current, raised to 5,000 volts, will be carried to two railway sub-stations, one nine miles and the other 14 miles from the generating station. Each sub-station will be provided with suitable step-down transformers of the General Electric air-blast type and two rotary convertors. The latter machines are constructed to maintain at the commutator brushes 5,000 volts at no load and 550 volts at full load. A transformer sub-station for 400 incandescent lamps will be located six miles from the generators.

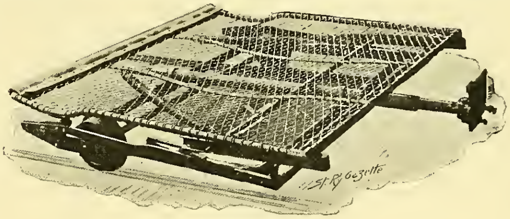

FIG. 4.

Service of Cables on the Brooklyn Bridge Railway.

During the 12 years since the opening of the Brooklyn Bridge, seven cables have been used on the cable railway, and the eighth cable is now in use. The seventh cable was removed on May 12, and we are indebted, says the *Engineering News*, to Mr. G. Leverich, M. Am. Soc. C. E., mechanical engineer of the bridge, for the following table showing the service of each cable, by which it will be seen that No. 7 gave a greater service than any of the others:

Cable No.	Term of service, days.	Total distance hauled, miles.	Total passengers hauled.	Total ton-miles hauled	Aver'ge loads hauled, tons.	Aver'ge ratio live to dead load.
1	1,140	223,329	49,002,442	22,142,706	97.0	6.0
2	607	120,232	47,840,262	25,492,892	212.0	7.3
3	393	82,099	36,941,884	20 395,073	248 4	7.6
4	356	74,111	34,134,409	18,923,469	255.3	7.6
5	520	111,119	56 287,452	33,857,669	304.7	8.3
6	509	109,475	58,071,062	35,149,894	321.1	8.4
7	511	111,136	59,815,950	35,932,894	323.3	8.3
8	Now in use.					

FINANCIAL NOTES.

NO BIDS FOR THE ORANGE RAILWAY.—The Orange (N.J.) Mountain Cable Railway was to be sold at auction on June 3, but no bids were received for the property.

LOUISVILLE STREET RAILWAY.—The Louisville Street Railway Company's gross earnings for May, 1895, were $114,246, and May, 1894, $107,403; increase, $6,843.

NEW ORLEANS TRACTION COMPANY.—The New Orleans Traction Company's gross earnings for May, 1895, were $119,142, and for May, 1894, $83,623; increase, $35,519.

MAY EARNINGS OF THE BUFFALO RAILWAY.—The report of the Buffalo Street Railway Company shows gross earnings for May, 1895, $141,225; May, 1894, $130,711; increase, $10,514.

EARNINGS OF BRIDGEPORT TRACTION COMPANY.—The report of the Bridgeport Traction shows gross earnings for the month of May, 1895, $25,523; for May, 1894, $12,351; increase, $13,172.

COLUMBUS STREET RAILWAY.—The following figures are taken from the report of the Columbus Street Railway Company: Net earnings, May, 1895, $28,098; May, 1894, $26,311; increase, $1,787; Jan. 1 to May 31, 1895, net earnings, $114,953; Jan. 1 to May 31, 1894, $106,958; increase, $7,995.

INCREASE IN STOCK.—Judge Cox has ratified the action of the Washington & Great Falls Electric Railway Company, of Washington, D. C., increasing the stock of the company from $500,000 to $650,000; the funds to be obtained by the increase in stock will be used for the construction and equipment of the road.

SALE OF THE IRONTON & PETERSBURG RAILWAY.—The Ironton & Petersburg Street Railway, of Ironton, O., will be sold at auction on July 5. No bids less than $20,000 will be received and each bidder must deposit $1,000 on making his proposition. The successful bidder will be required to pay the full amount in cash on the day of sale.

SALE OF THE SOUTH BEND & MISHAWAKA RAILWAY.—The South Bend & Mishawaka Street Railway, of South Bend, Ind., has been sold to Mr. Clifford, of Fitchburg, Mass., the highest bidder, who represented the bondholders. The purchaser is quoted as saying that many improvements will be made in the property soon, to put it in first class condition.

NEW LITTLE ROCK COMPANY.—The company to be known as the Little Rock Traction & Electric Company, which will control all the street car lines of Little Rock, and in whose interests the properties were recently purchased by Henry C. Haarstick, of St. Louis, was organized in Boston last week. It is composed principally of the United Electric Securities Company, of Boston, and the General Electric Company, of New York, and some local capitalists.

BATON ROUGE PURCHASE.—The railway and lighting franchises, together with the other property of the late Citizens' Electric Railway & Power Company, of Baton Rouge, La., have been sold by the Bank of Baton Rouge to the Home Electric Company, a new company organized by the local capitalists to run the plant. The price paid was $40,900. The bank bought this property recently under foreclosure and sold it for the exact sum of the mortgage indebtedness. The plant is a fine one, thoroughly equipped, and is in the hands of enterprising men, who will doubtless make it a paying investment.

NEW INCORPORATIONS.

NORTHEAST, PA.—The South Shore Electric Railway Company has been incorporated with a capital stock of $100,000.

SPRINGFIELD, ILL.—The Canales Trolley Company has been incorporated The capital stock is $100,000. The promoters are Adam M. Ross, Frank W. Canales, and T. Henry Pearse.

DALLAS, TEX.—The Dallas City Street Railway Company has been incorporated. Frank Clark, Baltimore, Md.; C. L. Blackford, Denison, Tex.; J. L. Sale, Dallas, Tex. The capital stock is $500,000.

PITTSBURG, PA.—The Gross Street Railway Company has been incorporated with a capital stock of $6,000 by W. B. Rhodes, Allegheny; Wm. H. Latshaw, Pittsburg; Joshua Rhodes, Allegheny.

HILLSBORO, TEX.—The Hillsboro Street Railway Company has been incorporated with a capital stock of $15,000. The promoters are R. J. Ware, H. W. Carter and C. E. Carter, all of Hillsboro, Tex.

PITTSBURG, PA.—The Negley Street Railway Company has been incorporated with a capital stock of $6,000 by W. B. Rhodes, Allegheny; Wm. H. Latshaw, Pittsburg; Joshua Rhodes, Allegheny, Pa.

BUFFALO, N. Y.—The Buffalo, North Main Street & Tonawanda Company has been incorporated with a capital stock of $75,000. The promoters are S. W. Petrie, T. H. Feary and J. H. Pardee, Buffalo, N. Y., and J. F. Farrall, Albany, N. Y.

CHICAGO, ILL.—The Hammond & Blue Island Railway Company, of Indiana, has been incorporated. The capital stock is $80,000. The promoters are Ed. S. Whitney, Fredk. B. Fuller, Jas. T. Maher and Ralph Martin. The company was incorporated in Indiana.

BATESVILLE, IND.—The Batesville & Oldenburg Railway & Electric Comanpy has been incorporated with a capital stock of $50,000. The promoters are Kendall M. Hord, Bellemy S. Sitton, Ed. K. Adams, Jonas Joseph, Shelbyville, Ind., John Hilderbrand, Batesville, Ind.

SAN FRANCISCO, CAL.—The Central American Development Company has been incorporated with a capital stock of $1,000,000. The company among other things proposes to build steam and street railways. The promoters are C. T. Thomas and A. Ballin San Francisco, Cal.; Frank A. Woodworth, Santa Barbara, Cal., and H. Cassin, Salvadore, Central America.

XENIA, O.—The Springfield, Clifton, Cedarville & Jamestown Electric Railway Company has been incorporated with a capital stock of $100,000 to build and operate an electric railway from Springfield through the towns named to Jamestown. Those interested are John B. Stevenson, G. A. McKay A. C. Carpenter, R. R. Knowles, R. F. Kerr and T. L. Magruder, last named of Xenia, O.

CHARLESTON, ILL.—The Charleston Electric Company has been incorporated with a capital stock of $5,000 to manufacture and deal in telephone, light, heat and power and street railway apparatus and supplies, constructing light, heat and power plants. The promotors are Richard Cadle, Frank C. Brooks and Wm. A. Highland.

LITTLE FALLS, N. Y.—The Little Falls Street Railway Company has been incorporated to construct a railway in Little Falls, N. Y., seven miles in length; capital stock, $75,000. The directors are William H. Tylee and T. C. Bates, of Worcester, Mass.; C. L. B. Tylee, Frank H. Viele, John L. Miller, Edwin J. Carpenter Charles M. Hyde, George E. Tylee and Morris E. Gregory, of Corning.

SAN FRANCISCO, CAL.—The Pressley Single Track Electric Railway Company has been incorporated with a capital stock of $500,000 to purchase, own, use and sell United States patents for electromagnetic safety railways and to grant to others the right to use and buy inventions. The promoters are L. C. Pressley, J. C. Rhoads, J. O. Jephson, C. S. Wheaton and W. F. Oecling, San Francisco, Cal.

NEWS OF THE WEEK.

CHICAGO, ILL.—Work has been begun on the Northwestern Elevated road.

BAY CITY, MICH.—The Interurban Trolley Company has petitioned the City Council for a franchise.

VENICE, ILL.—The construction of the Venice, Madison & Granite City Electric Railway has been begun.

BALTIMORE, MD.—Sanford & Brooks have commenced the construction of the Canton & Sparrows Point Railway.

NATICK, MASS.—The Natick Street Railway is to be extended to Woodville, the necessary $20,000 of stock having been subscribed.

HAMILTON, ONT.—The Board of Works has approved the by-law compelling all street cars to be equipped with fenders by Sept. 1.

SYRACUSE, N. Y.—The Syracuse & Oneida Lake Railway Company has made an application to the City Council for a franchise.

HARTFORD, CONN.—The Street Board has decided to adopt the Robins & Howe fenders as suitable types for use on the local street cars.

DETROIT, MICH.—Mayor Pingree has vetoed the ordinance giving the Citizens' Street Railway Company a franchise to build a loop line.

PRINCESS ANNE, MD.—Thomas H. Bock is at the head of an enterprise to construct an electric railway from Princess Anne to Deal's Island.

RAHWAY, N. J.—J. H. Tingley has secured the right of way for an electric railway at Perth Amboy from the Tottenville Ferry to the cemetery.

SAN FRANCISCO, CAL.—Mayor Sutro has indorsed a fender invented by S. Ducas and advocates its adoption by the local street railway company.

PAWTUCKET, R. I.—The Pawtucket Gas & Electric Lighting Company has signed a contract to furnish power for the Interstate Electric Railway Company.

NEW YORK, N. Y.—The Union Railway Company is preparing to extend its trolley lines through the southern Boulevard and Lincoln Ave. to West Farms.

BINGHAMTON, N. Y.—The work of laying out the route of the Binghamton & Union Electric Railway is now in progress under the direction of E. K. Harvey.

PHILADELPHIA, PA.—Work on the overhead trolley system for Market Street is well under way and the cable line on that street will soon be abandoned.

ORLANDO, FLA.—Work has been commenced on the electric railway to parallel the Southern Florida Railway. E. W. Henck is at the head of the enterprise.

OSHKOSH, WIS.—The Common Council has passed a resolution extending until Oct. 1 the time in which the Interurban Electric Railway Company may complete its line.

OAKLAND, CAL.—The General Electric Company has secured judgment against the Highland Park & Fruitvale Railway Company for $17,976, for electrical apparatus, etc.

PHILADELPHIA, PA.—The Fairmount Park & Haddington Railway, which has been leased by the Hestonville, Mantua & Fairmount Passenger Railway Company, has been opened for traffic.

NEW BRUNSWICK, N. J.—The New Brunswick Traction Company has purchased a large tract of land in Highland Park which will be improved as a park and connected with New Brunswick by an electric line.

LAKE GEORGE, N. Y.—State Treasurer Colvin and ex-Senator Emerson are interested in a project to construct a railway from Lake George to Warrensburg. The line will be operated either by electricity or steam.

NEW YORK, N. Y.—Judge Dugro has denied the application for an injunction restraining the Metropolitan Street Railway Company from operating a cable railway in front of the property of Meyer Feuchtwanger.

ROME, N. Y.—Work is now in progress on the construction of six Hardie compressed air motors at the Rome Locomotive & Machine Works. It is possible that the Rome Street Railway will be operated by these motors.

NEW HAVEN, CONN.—The Manufacturers' Street Railway Company has applied to the Common Council for rights in what is generally known as Fair Haven under a charter just obtained from the General Assembly.

PORT HURON, MICH.—Mayor Boynton and several Port Huron capitalists are planning to build an electric railway from Port Huron to Algonac along the river, thence to Chesterfield, so as to connect with the Grand Trunk.

CHICAGO, ILL.—Judge Smith has denied the petition of property owners on Evanston Avenue for a mandamus to compel the North Chicago Street Railway Company to extend its cable line from Fullerton Avenue to Diversey Street.

PHILADELPHIA, PA.—The coroner's jury in the case of William Harris, who died recently as the result of injuries inflicted by an electric car, censured the street railway company for running its cars at too high a speed and for failing to provide them with fenders.

SPARTANBURG, S. C.—It is announced that an electric railway connecting Spartanburg with five or six factory towns will soon be constructed. The line will be nearly 15 miles in length and will be constructed to Whiting, Glendale, Clifton and possibly to other towns.

NEW YORK, N. Y.—The Board of Estimate has apportioned the sum of $17,751 to pay the expenses of the Rapid Transit Commission up to July 1 Of this sum $12,500 is for lawyers' fees and expenses. The two counsel for the board are drawing $10,000 a year each and expenses.

PITTSBURG, PA.—A suit has been commenced by the Pennsylvania Railway Company and the Pittsburg, Virginia & Charleston Railway Company against the Homestead Street Railway Company, asking that the defendant company be enjoined from crossing the plaintiffs' tracks.

JERSEY CITY, N. J.—The Consolidated Traction Company proposes to operate cars or carrying bicycles on its line between Jersey City and Newark. This plan will enable wheelmen to reach the excellent roads of the country districts without encountering the bad roads of the intervening districts.

McKEESPORT, PA.—W. C. Soles, of the Versailles Traction Company, has been fined $20, and Superintendent McCaskie, of the Second Avenue, McKeesport & Reynoldton Railway Company, has been fined $90 for failing to equip electric cars with fenders in accordance with the provision of the city ordinance

BROOKLYN, N. Y.—It is probable that in the course of time the Bergen Street line of the Atlantic Avenue Railway will be extended to connect with the line of the Long Island Electric Railway Company, which is now building between Rockaway and Brooklyn. A connection of this kind would be advantageous to both companies.

POTTSVILLE, PA.—A car on the Schuylkill Electric Railway jumped the track between Port Carbon and St. Clair on June 2 and overturning down an embankment plunged into Mill Creek. Nine persons were on the car at the time including the motorman and conductor. One passenger was seriously injured and several were badly bruised.

HARTFORD, CONN.—General Manager Crawford, of the Hartford Railway Company, has appointed James B Goodrich general inspector with the power of an assistant general manager. John A. Crilly has been chosen adjuster. John Delourcey is assistant superintendent, in charge of the operating department and William Grattan is the new electrician.

BOSTON MASS.—A director of the Boston, Revere Beach & Lynn Railway is quoted as saying that electricity would soon be adopted on the line. A power house could be erected at Crescent Beach at the centre of the system and electric cars could be operated every 15 minutes. He believed that the adoption of electricity would result in a better and cheaper service

DETROIT, MICH.—John Savage has been appointed superintendent of the Consolidated Jefferson & Grand Avenue lines and the loop line at Fort and Congress streets. James Bullin is promoted to the position of superintendent of the Woodward Avenue line, and Andrew McBride has been appointed division superintendent of all the horse car lines except the loop line.

BOSTON, MASS.—The subscribers of the shares of the West Roxbury & Roslindale Electric Street Railway Company have organized by the choice of Clifford Devens as president; William P. Whittemore, clerk and treasurer; Thomas H. Dunham Jr., Charles G. Davis, Joseph Halstrick, William P. Whittemore, Clifford Devens, Charles H. Wise and George J. Morse, directors.

PHILADELPHIA, PA.—It is announced that the Baltimore & Lehigh and the York Southern railways will be equipped for electric traction. They are now narrow gauge steam lines, but will be reconstructed on the standard gauge. J. L. Blackwell, consulting engineer, has been employed to determine whether there is sufficient water power along the line to generate current for operating the line.

PHILADELPHIA, PA.—Judge Thayer has handed down an opinion dismissing the exceptions and sustaining the report of the referee in the equity proceedings brought by the Hestonville, Mantua & Fairmount Passenger Railway Company against the Forty-second Street & West Park Passenger Railway Company, to restrain the latter from laying tracks on the Spring Garden Street Bridge or its approaches.

PHILADELPHIA, PA.—The negotiations between the city solicitor and the People's Passenger Railway Company, which have been in progress for some time with a view to payment of the large claim which the city holds against the company for repaving and repairs upon the stree s occupied by the company, came to a practical conclusion last week in an arrangement for the payment of $69,131.97 by the company.

NEW ORLEANS, LA.—President McLellan, of the St. Charles Street Railway Company, announces that the cars may be operated by electric power by Aug. 1. The work on the power house has not yet begun, owing to delay in getting the iron for the framework The company, however, expects to arrange for power from the Louisiana Electric Lighting Company until the power house is completed. The work of laying the tracks is nearly finished.

MARYSVILLE, CAL —It is announced that work will soon be started on the proposed Marysville & Auburn Electric Railway which is to extend from Marysville eastward through the foothills of Yuba and Madera counties to Auburn, and will be 50 miles in length. It is to be used for freight and passengers. It is said that power will be furnished by the South Yuba Water Company, that is talking of building a transmission plant to furnish electric power in Sacramento.

KANSAS CITY, MO —The Supreme Court has reversed the judgment obtained by Jessie C. Hite in a suit against the Metropolitan Street Railway Company. In 1891 Mrs. Hite fell from a car as it was rounding a curve and her skull was fractured. She sued the company and obtained a judgment The Supreme Court, however, holds the accident was not due to the carelessness of the company's employees, that the jerking of the car was unavoidable and that Mrs. Hite was aware of the danger.

ALBANY, N. Y.—Certificates of extensions of their lines were filed by the following New York City railways with the secretary of state last week: Columbus & Ninth Avenue Railway Company, to operate a new branch commencing with the company's existing road, at Columbus Avenue and 109th Street, westerly upon 109th Street 450 feet, to connect with a branch of the Ninth Avenue Railway Company. Ninth Avenue Railway Company, commencing at Amsterdam Avenue and 109th Street, easterly on 109th Street 450 feet, to connect with a branch of the Columbus & Ninth Avenue Railway.

PHILADELPHIA, PA.—The referee has decided in favor of the city in the suit brought by the Ridge Avenue Passenger Railway Company, of Philadelphia, against the city The action was brought to secure $100,000 damages occasioned that company by obstruction to the running of its cars on Ridge Avenue in the years 1873 and 1874 when changes were made in the grade. It was alleged by the company that unreasonable delay in completing the change of grade caused the company to sustain heavy losses in passenger traffic. The suit was brought in 1875, but various causes have combined to protract the litigation.

MONTCLAIR, N. J.—Halsey M. Barrett, representing the North Jersey Traction Company, appeared before the Montclair Town Council last week and filed requests for franchises for three lines of electric road in the town. The first route is from the Bloomfield line along Bloomfield to the Verona line; the second, from Bloomfield on Midland Avenue to Claremont Avenue, to Central Avenue, to Walnut Street, to Valley Road, to Alexander Avenue in Upper Montclair; the third, on Elm Street from Bloomfield Avenue to Orange Road, to Cedar Street, to High Street and to the boundary line of West Orange.

SAN FRANCISCO, CAL.—It is expected that the Market Street Railway will secure the contract for hauling the stone for the new postoffice, to be built at Seventh and Mission Streets. If the contract is let to the company it will haul the stone at night from the Southern Pacific yards at the foot of Seventh Street to Mission Street. During the day the line will be operated as a passenger road. The freight cars will be operated on the street by electricity. Flat cars will be constructed especially for the purpose. Permission to operate the Seventh Street franchise as a freight road must be secured from the supervisors.

ST. LOUIS, MO.—Contracts have been awarded for the reconstruction of the Jefferson Avenue mule line and work is to begin immediately. The contracts call for the completion of the road within 100 days from June 1. Power will be obtained from the four great systems that own the line, namely, Missouri Railway, Lindell, Union Depot and Cass Avenue & Fair Grounds. P. C. Maffitt the president of the road, says that this arrangement for the power is only temporary, as either this fall or next spring a power house will be built. By dividing up the line the great power houses will not feel to any extent the call for current.

NEW YORK, N. Y.—It has been practically decided by the controlling powers of the Metropolitan Traction Company to lay a cable the entire length of the University Place line from Fourteenth Street down to the junction of Barclay and Broadway. Traffic on the Broadway line has grown to such an extent that the managers of the company deem it necessary to construct another downtown cable line as a measure of relief. When the Lexington Avenue Cable line is able to connect with the Broadway line at Twenty-third Street, some of the Lexington Avenue cars will be run over the University Place route. Inasmuch as the Metropolitan Traction Company owns the right of way over the old University Place line, it is expected that the projected cable extension can be made without much delay.

BALTIMORE, MD.—It is announced that the work on the Baltimore & Washington electric line is progressing favorably, and, if nothing occurs to delay it, the new system will probably be ready for operation the entire length before the end of the year. The promoters hope to have part of the Baltimore section running by July 4. The line is composed of three sections, one extending south from this city, the second north from Washington. These two sections reach two different points, so that the third section will be the intervening gap, and the latter will be the last completed, as the idea is to construct the two city sections first, and have them in operation during the building of the third section, especially because they reach populous settlements in the vicinity of Baltimore and Washington. The financial arrangements have been completed and the company has sufficient backing to carry out the work.

TRADE NOTES.

H. H. HARRISON has taken an interest in the business heretofore conducted by R. B. Corey, Havemeyer Building, New York. The firm will make specialties of arc lamps and carbons.

CHARLES D. MOSHER, of No. 1 Broadway, New York, has just issued an interesting pamphlet devoted to the steam separator with which his name is identified. The pamphlet contains matter of great value to the steam users and they will do well to provide themselves with copies.

J F. MACARTNEY will soon open an office in New York for the Ohio Brass Company of Mansfield, O., manufacturer of street railway supplies. Mr. Macartney states that recent visits to a considerable number of street railway companies prove that business in that field is rapidly improving.

BERLIN IRON BRIDGE COMPANY'S CONTRACTS.—The Norwalk Tramway Company, of Norwalk, Conn., has placed with the Berlin Iron Bridge Company, of East Berlin, Conn., the order for a car barn 45 feet in width and 160 feet in length constructed entirely of iron. The contract for the steel bridges for the Central Railway & Electric Company, of New Britain, Conn., for its various extensions, has also been placed with the Berlin Iron Bridge Company.

THE PRENTISS TOOL & SUPPLY COMPANY, with principal headquarters at 115 Liberty Street, New York City, has recently removed its Chicago branch from 59 to 62 and 64 South Canal Street. The new quarters are well located and are equipped with every essential for the convenient and efficient handling of the large business done by the Prentiss Company at this point. The showroom and offices occupy a floor space of 40 x 140 feet and a complete line of new and second-hand machinery of the latest and most improved design will be carried at all times Those visiting it will find the new Chicago branch of the Prentiss Tool & Supply Company to be one of the finest machinery stores in the West.

THE NEWCASTLE SEAMLESS STEEL TUBING COMPANY will build a factory at Newcastle, Pa. The company will manufacture among other things trolley poles. The company has just been organized. The directors are John Stevenson, Jr., David C. Wallace, John H. Preston, L. S. Hoyt and M. H. Henderson. John H. Preston will have charge of the business management of the concern and David C. Wallace will be the secretary and treasurer.

THE WESTON ELECTRICAL INSTRUMENT COMPANY has found its present quarters too contracted in Newark and has decided to build an extension plant at Waverley, a suburb of that city. The company has purchased 48 acres of land for this purpose. The location is desirable in every respect. Convenient shipping facilities will be provided by a spur track leading to the Pennsylvania Railway. The buildings, the erection of which will probably commence in September, will be constructed of steel and will be model structures in every respect. A new laboratory for the use of Prof. Weston will be built. Part of the land which the company has purchased will be divided into building lots and sold to the employees on easy terms.

J. H. VAIL, with offices at 39 Cortlandt Street, New York, is prepared to act as consulting and supervising engineer, for designing and constructing electric railways, electric transmission of power, electric light stations and systems of distribution and general engineering work. Mr. Vail has been engaged by the Wilkesbarre Electric Light Company as supervising and contracting engineer for the building of a large electric lighting and power station. The company has purchased a valuable culm bank in Wilkesbarre, containing upward of 140 000 tons of excellent fuel and proposes to erect a modern power house and new steam plant on the property. When the new station is completed the company will be in a position to manufacture current at as low a price as it can be produced in this country, excepting from cheap water power. The work is expected to be completed in from three to four months.

Record of Street Railway Patents.

UNITED STATES PATENTS ISSUED JUNE 4, 1895.

540,232. SWITCHING DEVICE; William M. Clark, Philadelphia, Pa. Filed Oct. 17, 1894. A blade is carried by the car in advance of the car wheel and adjacent to and projecting below the head of the rail. There is a supporting device on the car to which the blade is attached intermediate of its edges and a mechanism is provided to turn the blade so that its forward end points toward and away from the head of the track rail. A spring device when unopposed holds the blade in a position parallel with the track rail.

540,244. ELECTRIC HEATER; Edward E. Gold, New York, N. Y. Filed Jan. 29, 1895. The heater coils are horizontally extended and the insulating supporting plates are vertical with end projections between which the coils are stretched. Lateral projections embracing the coils at intervals on opposite sides and are so constructed that air spaces between the plates and free openings are provided at the top and bottom for the circulation of air through the coils.

540,284. SNOW-PLOW; William J. Tremper, Charles V. Rote and William A. Armstrong, Lancaster, Pa. Filed Aug. 21, 1894. A single rod passes through the floor of the car and a snow-plow has a revoluble connection with it and is supported thereby. Means are provided for actuating the rod so as to lower or raise the plow and braces are constructed to detachably connect with the ends of the plow.

540,305. CLOSED-CONDUIT ELECTRIC RAILWAY; Michael F. Flynn, Stamford, Conn. Filed July 28, 1894. Supply and return wires are contained in the closed conduit and a contact rail is arranged on the conduit. A trolley mounted on the car runs on the contact rail. Switches are provided at intervals on the contact rail adapted to connect with the supply and return wires, while mechanism which is carried by the trolley successively closes and opens the switches to the supply wires.

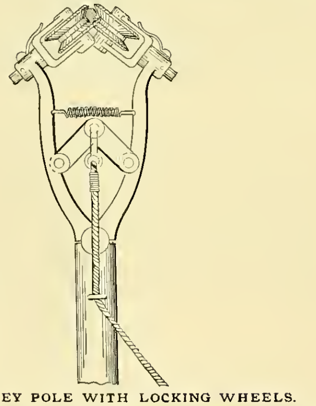

FIG. 540,340.—TROLLEY POLE WITH LOCKING WHEELS.

540,340. TROLLEY POLE WITH LOCKING WHEELS; Thomas Thompson, Newark, N. J. Filed Oct. 29, 1894. Two trolley wheels, one in advance of the other, are inclined toward the lower quarters of the trolley wire and have grooves smaller in the bottom than the wire. The lower flanges are proportioned so as to project sufficiently past the centre of the wire upon its lower side when pressed thereon, so as to close the bottom of the space between the rims of the wheels when separated for application to the wire. (See Illustration.)

540,374. CAR FENDER; Hermann Wettstein and Carl Rodmann, Philadelphia, Pa. Filed Oct. 29, 1894. The fender has a main stationary frame with slots in its sides and a supplemental frame is pivotally connected with it by a cross-bar. Springs are connected to the main frame and to a cross-bar, and a trigger having a cross-bar is mounted in the supplemental frame. Springs are connected at their ends with the trigger and supplemental frame.

540,379. CAR FENDER; John B. Benton, Elizabeth, N. J. Filed April 11, 1895. The fender is constructed of iron pipe or tubing coupled together and comprising a rear frame and forwardly curved fender bars. Clamping plates are provided to clamp and hold the fender bars to prevent vibration at the joints.

540,398. ELECTRIC HEATER; John F. Meek, Denver, Col., assignor to the H. W. Johns Manufacturing Company, of New York, N. Y. Filed Feb. 5, 1894. The resistance fabric consists of a current-bearing wire woven with non-conductive threads into cloth, which are made of asbestos and form the warp threads of the fabric. The current-bearing wire is continuous and forms the woof threads of the cloth and is adapted to form a selvage so that the fabric may be cut parallel with the woof threads into pieces of suitable sizes for use as cushions and other purposes. Each piece thus cut off is adapted to be an electric heater.

540,403. SANDING DEVICE; Jacob H. Osmun, Allentown, Pa. Filed Feb. 12, 1895. The sand-box is composed of upper and lower parts having corresponding circular meeting portions in both of which are central holes and two larger holes or openings. In the upper part there is a chamber and the lower part is tapered and extended into a tubular form. On the top of the lower part there are springs and a circular disc having a central shaft which is extended through the central holes and carries agitator arms. Means are provided for imparting a rotary motion to the disc.

540,466. SWITCH FOR STREET RAILWAYS; Richard S. Tappenden, Cleveland, O., assignor of one half to Thomas Tappenden, same place. Filed Aug. 3, 1894. A U-shaped lever is pivoted at its central portion to a pivoted switch tongue. An upwardly extended arm operatively engages the switch rail or tongue at the point centrally between the extremities of the lever.

540,476. STREET INDICATOR; John P. Wick, Parma, assignor of one fourth to Clara S. Lear, Cleveland, O. Filed Sept. 29, 1894. A traveling belt suitably supported within the car bears the names of the streets that are to be indicated. A segmental way or guide is located outside and suitably supported from the car. A block movable upon the way is operatively connected with the belt and is provided with a concavity upon its forward side. Any suitable object or device suspended at a certain distance above the street will be engaged by the block as the car progresses.

540,485. PICK-UP CAR FENDER; Edwin C. Crouch, Washington, D. C. Filed March 28, 1895. The pick-up frame is fulcrumed to the car by hangers and a fender is arranged longitudinally at the side and extends in front of the wheels. The fender is connected at its forward end to the pick-up frame and is supported thereby so as to act as a counter balance.

540,480. TROLLEY FOR ELECTRIC RAILWAYS; Theophile Euphrat, Darien, Conn. Filed March 5, 1895. The fork is adapted for the ordinary trolley wheel, the wheel housing being pivoted in the jaws of the fork by the ordinary trolley wheel pivot. The beak rests on the head of the fork. A grease chamber is provided for the wheel and the detachable trolley wheel is confined by the jaws of the fork when in working position.

540,487. ICE-DETACHING TROLLEY FOR ELECTRIC RAILWAYS; Theophile Euphrat, Darien, Conn. Filed March 22, 1895. The wheel has a grooved serrated ice-breaking face and the housing block in which it is mounted has cheeks formed as flaring extensions of the groove and coincident with the transverse outline of the groove. The fork of the trolley pole is adapted for the ordinary trolley wheel, the housings being secured in the fork by the trolley wheel pivot and by a rest bearing on the head of the fork.

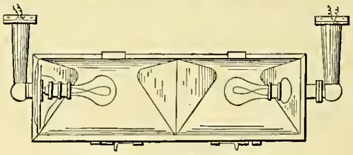

FIG. 540,572.—HEADLIGHT.

540,569. CONDUIT ELECTRIC RAILWAY SYSTEM; Charles M. Allen, San Francisco, Cal. Filed Oct. 3, 1894. The conduit has a series of contact boxes fixed in it and at one side of the slot there is an insulated main conductor extending along the line of the boxes. Insulated boxes are provided within the contact boxes and stationary contact plates are located in the former and connected with the main conductors. There are movable plates also within the interior of the insulated boxes having shanks that extend through the boxes and provided with rollers. A contact bar supported from the car forms contact with the rollers and forces the contact plates together as it passes, means being provided for withdrawing the contact plate from the stationary one.

540,572. HEADLIGHT; George W. Baumhoff, St. Louis, Mo. Filed Aug. 20, 1894. The headlight comprises hangers formed with lateral extensions and passageways for the wires which extend through the hangers and the extensions. A sleeve is provided with a flange and is mounted on one extension, the flange being located on the other extension. A spring surrounds the flanged extension and a cylinder formed with inner and outer flanges surrounds the spring. Means are provided for detachably connecting the outer flange of the cylinder with the extension flange adjacent to it. A lamp box is secured to the flange of the sleeve and to the inner flange of the cylinder and nuts limit the movement of the box endwise. (See Illustration.)

Street Railway Gazette.

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Electric Traction Company of Philadelphia.—II.

The condensers and air-pumps are located in the basement under the engine room, Fig. 2. The space, which is surrounded by a brass railing, is entirely open, so that the operation of the condensers can be seen from the engine room floor; stairways lead from the engine room to the space occupied by the condensers. The jet condensers which alone are used are of the Blake type. The air-pumps are of the independent vertical twin type of the same make, and maintain a vacuum of 27½ inches in the general main into which the engines exhaust. Three condensers are in use, two of which have a capacity of 1,200 hp each. Each air-pump has two steam cylinders, 12 inches in diameter, and two air cylinders, 25 inches in diameter. The third condenser is located between the other two and its capacity is equal to that of the other two combined. The steam cylinders of the larger-sized condenser are 16 inches in diameter and its air cylinders are 32 inches in diameter, with 21-inch stroke.

The steam cylinders rest on a cast-iron table and the latter is supported by four heavy columns of wrought iron, which are bolted to lugs cast on the exhaust chamber. The air cylinders are of cast-iron with linings, buckets and rods of composition. The plates covering the round hand holes which give access to the brackets and foot valves are also of composition. A beam provided for operating the valve gear is pivoted between the piston rods, being connected to each of the latter by short links.

The valves of the vertically moving steam cylinders are operated alternately by bell crank levers which are connected to the piston of an auxiliary cylinder located between the main steam cylinders. The piston is controlled by a small D-slide valve, one arm of the operating bell crank lever of which is connected to the beam by a vertical rod. Each of the steam cylinders is provided with regulating valves for adjusting the exhaust cushion and by means of adjustable collars the stroke of the pump can be lengthened or shortened readily even while the pump is in motion. The smaller condensers have injection pipes, 10 inches in diameter, and exhaust openings, 20 inches in diameter, while the injection pipe and exhaust opening of the larger condenser are 12 and 24 inches, respectively. The exhaust from the engines enters the condensers at the top and intermingles with the spray which enters through the injection pipe. The thickness of the spray, which is formed

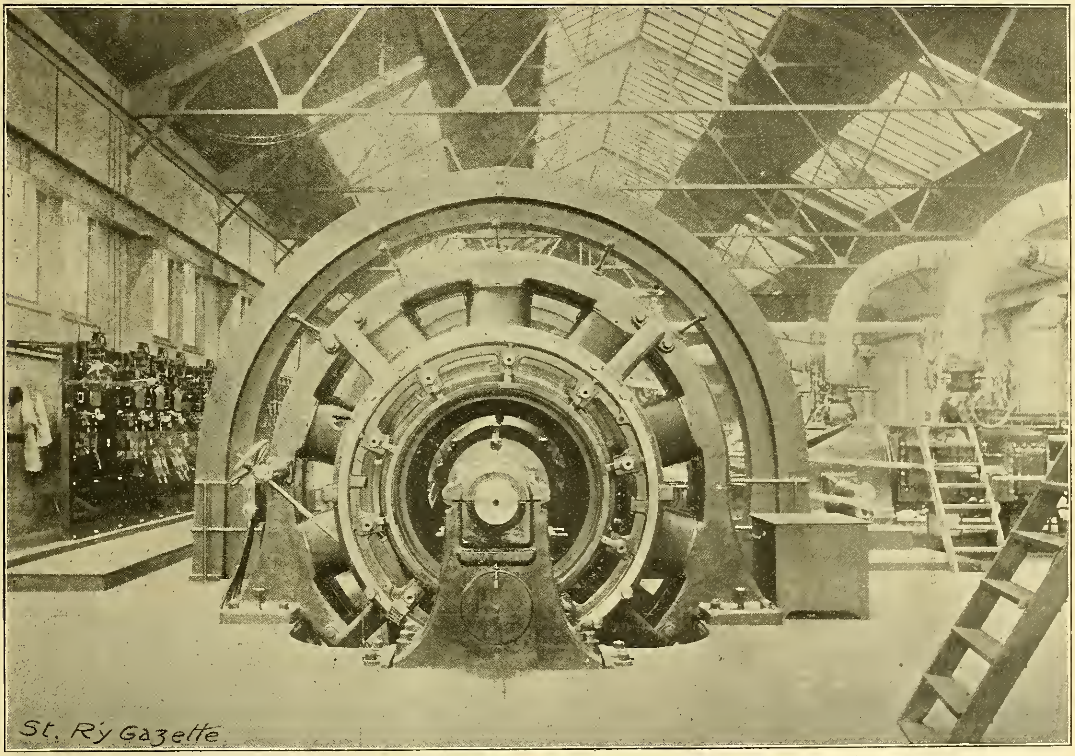


FIG. 1.—ONE OF THE GENERATORS.

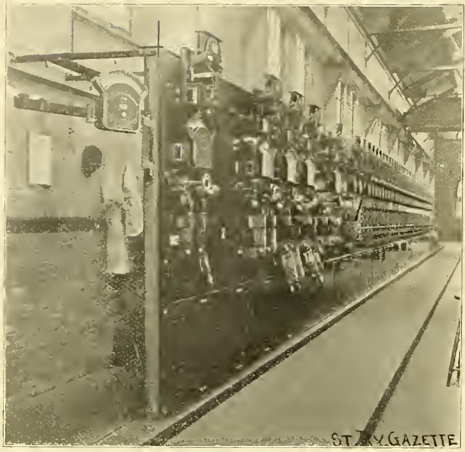


FIG. 3.—SWITCHBOARD.

by an inverted cone located in the top of the injection pipe, is regulated by a hand wheel and beveled gears which rotate a vertical shaft that supports the cone. The top of the shaft is threaded and as it is turned the cone is raised or lowered, thus increasing or diminishing the opening through which the water enters. A simple but effective device used to prevent the condenser from filling and allowing the water to back up to the cylinders, consists of a chamber with a float which is raised by any accumulation of water, thereby opening an air valve, breaking the vacuum and preventing the entrance of additional water. The exhaust mains are equipped with Blake automatic relief valves. The plant is provided with Stratton separators, the drip from which and from the jacket traps is taken by a Blake receiver and returned to the boiler feed line.

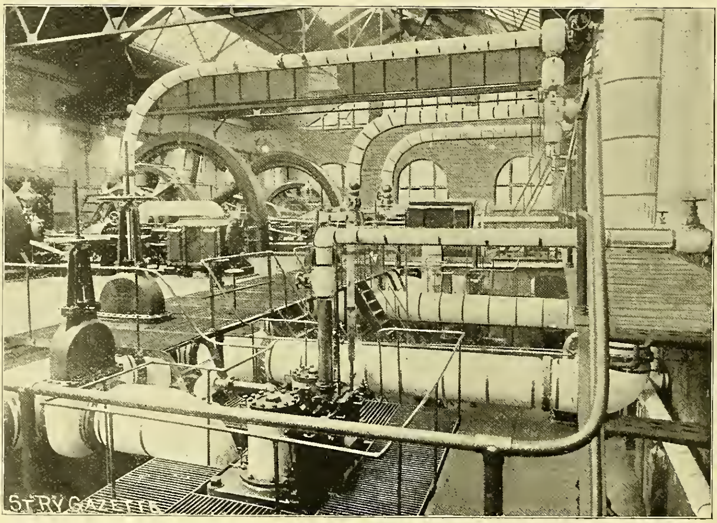


FIG. 2.—CONDENSING APPARATUS.

The feed water is taken from the Delaware River, and is pumped to the hot well whence it is taken at 110 degrees and passed through a Kensington horizontal heater. The boiler feed pumps, the blower engine and the Westinghouse engine which runs the coal conveyor, exhaust into the heater, thereby raising the temperature of the feed water to about 20 degrees before it is passed to the economizers.

Connections are made with the city mains from which water may be taken should the supply from the river, for any reason, fail. The feed pumps are of the Blake manufacture; each of them has a capacity sufficient to feed the entire boiler plant.

The electrical equipment is of the most modern description. Five multipolar generators, four of 800 kilowatts capacity each, and one of 200 kilowatts capacity are in service. The machines, which are directly connected to the engine shaft, were furnished by the General Electric Company, Fig. 1. The armatures are keyed to the engine shafts between the intermediate and the outward bearings, resting on a heavy sole plate, which also supports the armature fields. The switchboard, Fig. 3, is located in the centre of the south side of the room, about six feet from the wall, affording easy access to all connections. It is of marbleized slate of the General Electric type, and is so arranged that it can be expended to the full length of the engine room. In addition to the regular positive bus bar the switchboard is provided with an extra positive bus bar with a potential of 650 volts to maintain the potential on some of the outlying lines which are far removed from the power station. The company is constructing a power station on the Schuylkill River at South Street, and when the new plant is completed the use of the 650-volt current will be discontinued and the plant will be run on one potential until the Fox-Chase extensions, which are a great distance from the station, are built, when high potentials will again be used for long-distance work. The employment of the double potentials has the advantage that one of the company's smaller power plants may be shut down entirely at night when the traffic is light and the system operated with

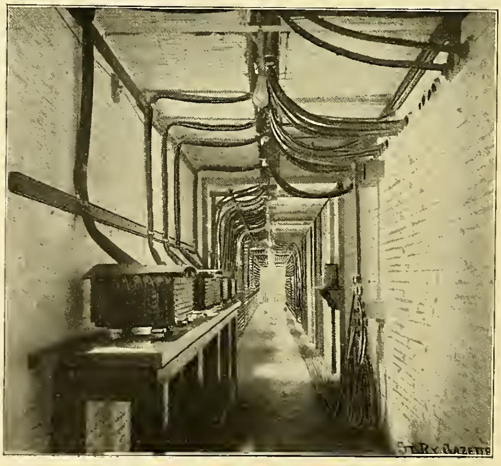


FIG. 4.—CABLE VAULT.

the high potential current from the large station. The cable vault, Fig. 4, is located in the basement directly beneath the switchboard and extends the entire length of the building.

There are 46 outgoing cables which are carried by brackets arranged along the walls, and which enter the conduits at the west end of the vault. The return cables are carried along the floor as shown in the illustration. A testing room equipped with a compete set of testing instruments is located in the east end of the vault. The rheostats are also located in the vault, and are shown at the left in the cut. The plant was constructed under the supervision of Axel H. Engstrom, who also has charge of the construction of the company's new South Street station.

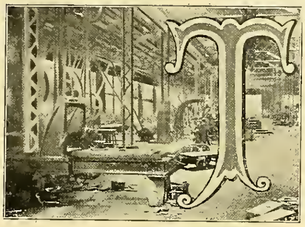
Electricity on the Manhattan Elevated.

The report current last week that the contract for the electrical equipment of the Manhattan Elevated system in New York had been awarded to the Westinghouse Electric & Manufacturing Company was incorrect. The rumor was started by the visit of Colonel F. K. Hain, vice-president and general manager of the Manhattan Company, to the factory of the Westinghouse Company. Mr. Hain and several of the officers are making an investigation to determine whether the substitution of electricity for steam will be advisable. Mr. Hain is quoted as saying: "We have not even definitely decided on abandoning steam for electric motive power. We have thought electricity might be cheaper and more convenient. On this trip, I will make it a point to convince myself of the adaptability of electricity to run trains on our elevated system. If I am satisfied on that point, the probabilities are that we will finally give up steam and substitute electricity as a driving power. Of course, I cannot yet say who will get the contract for the equipment."

Trolley Parties in Philadelphia.

Trolley parties are fully as popular in Philadelphia this year as last. The companies have adopted measures to prevent the blowing of horns and the setting off of firecrackers which were disagreeable incidents of the parties in quiet districts a year ago. Many of the cars chartered by the pleasure-seekers are elaborately decorated with incandescent lamps and drapery, and an orchestra not infrequently adds to the pleasure of the ride.

New Plant of the Westinghouse Electric & Manufacturing Company at East Pittsburg.—I.



THE situation of Pittsburg seems to be singularly favorable to the development of large and successful manufactories. So good an authority as Mr. Carnegie, however, is responsible for the assertion that the wonderful growth is attributable not merely to the advantages which the city enjoys, in respect to fuel, raw material, etc., but also in a very great degree to the perfection of manufacturing methods. Certainly the city has pinned its faith to methods calculated to cheapen cost as well as to improve the product, and the progress along this line furnishes striking examples of growth in the industrial world. The Westinghouse Electrical & Manufacturing Company has taken advantage of all of these favorable conditions, in planning and organizing its new factory at East Pittsburg, 12 miles from Pittsburg, in which it has centralized its varied interests. The new works furnishes an interesting example and a typical one in the sense that the plant embodies vast improvements, but at the same time the innovations are such violent departures from existing practice that it would scarcely be correct to regard the factory merely as one representing natural growth and enterprise. The plant is novel and furnishes illustrations interesting alike to the student and manufacturer. In it are utilized methods generally regarded heretofore as experimental; in fact it embodies the very latest developments in the field of electrical engineering.

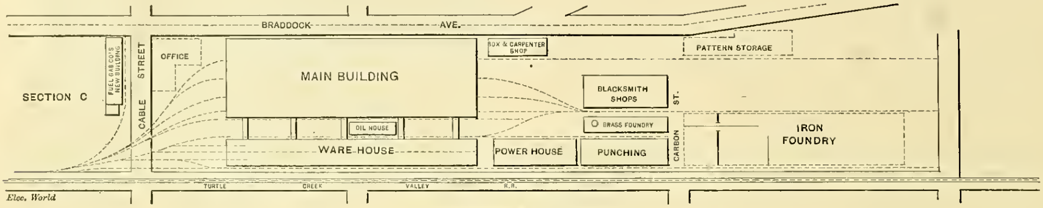
The Westinghouse Company was incorporated in 1886, and the present administrative officials are: Board of Directors: Charles Francis Adams, Lemuel Bannister, August Belmont, N. W. Bumstead, A. M. Byers, Marcellus Hartley, George W. Hebard, Henry B. Hyde, Brayton Ives, George Westinghouse, Jr.

Officers: Chairman, Brayton Ives; president, George Westinghouse, Jr.; first vice-president and general manager, Lemuel Bannister; second vice-president, G. W. Hebard; assistant general manager, W. C. Clark; electrical

WESTINGHOUSE FACTORIES—VIEW FROM THE NORTHWEST.

engineer and assistant manager, L. B. Stillwell; secretary and attorney, Charles A. Terry; treasurer, Ph. Ferd. Kobbe; assistant treasurer, George H. Lewars; auditor, F. H. Ketchum.

The engineering staff comprises the following: General superintendent, Albert Schmid; superintendent, Philip Lanze; consulting electrician, O. B. Shallenberger; electrical engineer and assistant manager, L. B. Stillwell; electrician, Charles F. Scott.



PLAN OF BUILDINGS.

Buildings and Equipment.—The main building of the Westinghouse plant is 754 feet in length, 231 feet in width, and 67 feet high to the ridge of the central roof truss. Along either side of the building, 25 feet above the floor, run galleries 80 feet in width. The next largest building was designed for a warehouse and shipping room on the first floor and a detail manufacturing department on the second floor. The warehouse is 574 feet in length, 76 feet wide, and 62 feet in height. The building is of the same general design as the main building, and connected to the latter, on the second floor, by means of five enclosed bridges. Directly back of the warehouse is the power house, behind which is a two-story building 258 feet long, 76 feet wide and 62 feet high, used on the ground floor for storing and annealing sheet iron. The second floor is devoted to the punching department, about 60 machines being there employed. Between the main building and the wareroom is a brick and iron building, completely fireproof, four stories in height, 187 feet long and 25 feet wide, used as a paint shop, drying room, and oil house. Back of the main building is the temporary carpenter and box-making shop, 192 feet by 60 feet by 32 feet. Alongside of the punch shop, and 300 feet east of the main building, is a blacksmith shop, and also a temporary brass foundry, the former 241 feet by 80 feet by 45 feet, the latter 241 feet by 40 feet by 26½ feet. The six principal and permanent buildings are of brick and iron fireproof construction throughout. The

MACHINE SHOPS—MAIN AISLE.

ALBERT SCHMID.

floors are slow burning, and designed to sustain 500 pounds to the square foot. All the buildings are most pleasantly located and completely lighted by double windows 10 feet wide, situated every 16 feet along the side, and by large skylights every 32 feet in the roof. The company proposes still further to extend its works by the erection of an iron foundry in the rear of the main buildings.

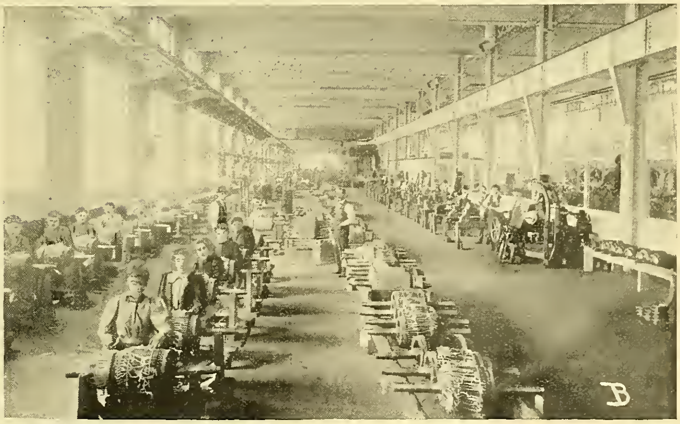
The arrangements for heating the buildings are of the most improved type. Steam radiators are located at points just under the roof, and 80-inch Sturtevant blowers are used to force the heated air through distributing pipes 36 inches in diameter at the heaters, and made gradually smaller as the air is distributed. The Williams vacuum system of Warren Webster & Co., Camden, N. J., is installed, and by its use the back pressure of the non-condensing engines is materially reduced. The water supply is derived from a reservoir located on the hills back of East Pittsburg, and filtered drinking water is distributed through the various buildings by means of pipes connected to a 10,000-gallon filter, of the New York Filter Company. Quick intercommunication between the various departments and offices is provided by a local telephone system, with instruments in each office, and a small exchange is located in the west end of the warehouse. Long-distance lines connect the factory with the Pittsburg Central, and another local wire runs to the city office of the Westinghouse Company.

O. B. SCHALLENBERGER.

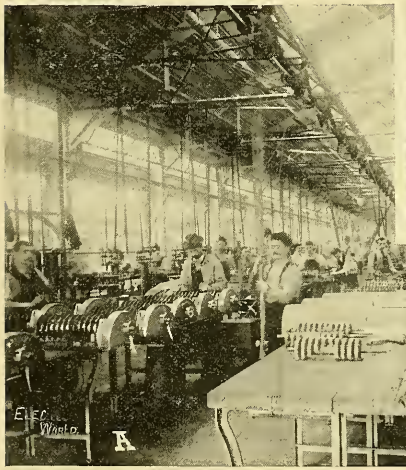
L. B. STILLWELL.

The Westinghouse Company has always made an object of having special tools for its work, thereby effecting economy in time and cost of manufacture and securing uniform and interchangeable parts, and for the new works many additional special tools have been designed. For the purpose of making and repairing the tools required, there has been organized a very complete and extensive tool department, where over 130 employees are kept constantly at work making and replacing all sorts of tools.

In planning the building, arrangements were provided for manufacturing apparatus quickly and with the minimum amount of labor. Section "A," in which the street car motors are built, furnishes an example. In one end of the section the armature discs

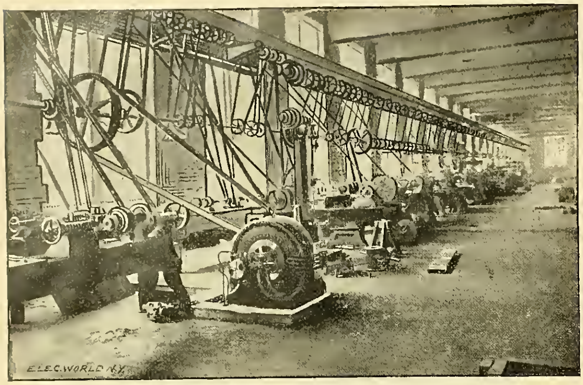


WINDING STREET RAILWAY ARMATURES.

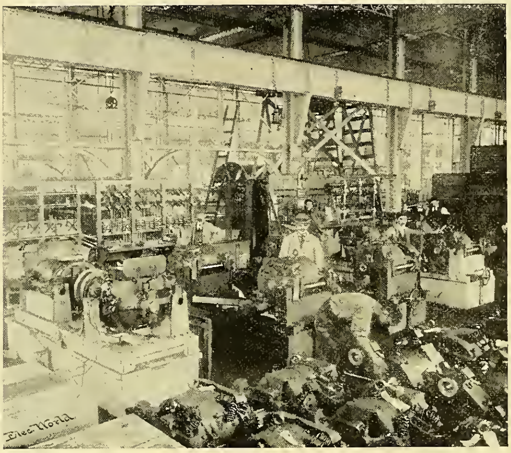


ASSEMBLING CONTROLLERS.

and shafts are received and built up. The lathe-turning and filing departments are immediately adjoining, so that no time or labor is lost in transportation. Next come the armature winders, and following them the men who are employed in machining and fitting up the fields. After the motors are assembled they are turned directly over to the testing department and then passed to the packers, so that the manufacture of these machines is an almost continuous operation from the building up of the armature cores to boxing the motors for shipment. The employees have been organized in an equally satisfactory manner. There is a head foreman in charge of each of the general sections, and under him assistant foremen for the sub-divisions into which the work is divided. Every piece of detail apparatus, before it is sent to the shipper, is thoroughly tested. The company has organized a large corps of testers and inspectors, who follow the apparatus through its construction from the beginning to the very end. All shipments from the factory are made by the Pennsylvania Railway, on the line of which the factory is located, and the arrangements of the buildings are such as to allow the freight cars to be run directly within the building. The company now undertakes the manufacture of a larger line of electrical apparatus than has heretofore been attempted. Every form and size of motor and generator for direct, alternating and polyphase currents, from ⅛ to 5,000 horse-power, are now being regularly manufactured. The arc and incandescent lamp business has been extended to meet every conceivable want in this direction. Detail apparatus has been perfected in every respect, and is being manufactured on the largest scale.



ONE OF THE POWER MOTORS.



TESTING RAILWAY MOTORS.

Power Plant.—The Westinghouse Company decided to operate the machinery in its factory throughout by electricity, and the polyphase system was adopted because of the ease and simplicity attending the handling of generators and motors. Since the points to which current is carried are all near the generating station, the polyphase current has no advantages in respect to transmission and distribution. The power house is a brick structure, 206 by 76 feet. The equipment in the dynamo room consists of three 500-hp two-phase and two 500-hp direct-current generators, each connected to a 500-hp Westinghouse compound engine. These generators are now in operation, and the plant is being increased by the installation of a 500-hp direct-current generator directly connected to a 500-hp steeple compound Westinghouse engine of a new type. A revolving transformer or two-phase motor has been installed in the plant for driving a direct-current arc-lighting machine and for rectifying a part of the two-phase current which serves as exciting current for the fields of the polyphase generators. An overhead electric crane affords a quick and convenient means of handling apparatus to be installed or repaired.

Steam is generated in five batteries, each of 500 hp, of Pierpont vertical boilers. The boilers are fired from two Roney automatic stokers which are fed with coal from cylindrical iron tanks suspended from the roof trusses.

The following figures illustrate the extent to which electricity is used throughout

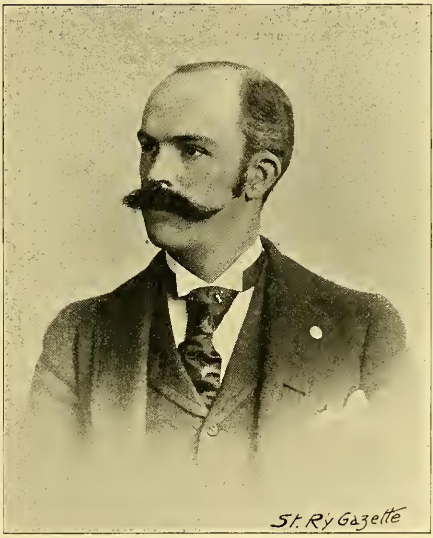
VIEW IN MACHINE SHOP.

the factory. In the various shops, 57 polyphase 220-volt motors are employed with an aggregate capacity of 1,400 hp. The sizes are as follows: 10 hp, 12 motors; 15 hp, four motors; 20 hp, 18 motors; 25 hp, one motor; 30 hp, 11 motors; 40 hp, nine motors; 60 hp, one motor; and 75 hp, one motor.

The cranes, which are eight in number, are operated by 500-volt direct-current motors. There are 17 electric freight and passenger elevators in the factory which were at first operated by direct-current motors ranging from 20 to 30 hp, but multiphase motors are now being substituted.

Street Railway Engineers.—VIII.

W. FRANK CARR.



W. FRANK CARR.

The West Chicago Street Railway Company, of Chicago, Ill., is rapidly equipping its subordinate lines with the overhead trolley system. The electrical mileage will eventually be considerable and the improvement will be one of great importance to the West Division of the city, as the new lines will afford the best of transit facility for a district in which the provision in this respect has been heretofore insufficient. The superintendent in charge of the electrical construction for the company is Mr. W. Frank Carr, an engineer of extended experience in the electrical and street railway fields. Mr. Carr was born in Holyoke, Mass., and was graduated from the Massachusetts State College at Amherst. He obtained his technical education in the Massachusetts Institute of Technology, of Boston, and was graduated from its civil engineering department. During 1882 and the following year he was employed in general engineering; the most important work in which he was engaged was the construction of the sewerage system in Keene, N. H., Mr. Carr occupying the position of chief inspector. In 1884 he was engaged as assistant bridge engineer of the Boston & Lowell Railway Company under Mr. Edward S. Shaw. In 1885 he opened an office in Minneapolis as contracting and consulting engineer and made a specialty of water works and bridges. At the same time he was engaged in considerable work in connection with parks, the most important of which were the Washburn Park, of Minneapolis, and the Half Moon Island Park, of Eau Claire, Wis., the property of the late George B. Shaw, president of the National Electric Manufacturing Company of that city. During 1887 and 1888 Mr. Clement C. Smith, formerly engineer of the Milwaukee Street Railway Company, and since of the Chicago City Railway Company, was associated with him as junior partner.

In the latter part of 1888 Mr. Carr decided to enter the street railway field and was first employed as draughtsman and subsequently as assistant engineer by Mr. Clift Wise, chief engineer of the Minneapolis & St. Paul system, now known as the Twin City Rapid Transit Railway. At this time plans, specifications and estimates were made for 30 miles of cable railway for Minneapolis, and 17 miles for St. Paul. The cable plans for Minneapolis, however, were discarded, as President Thomas Lowry came to the conclusion, after an extended investigation, that it would be wiser to introduce the overhead trolley system. When Mr. Wise resigned, to accept a position in the East, Mr. Carr was appointed chief engineer, and while in this position built the track work and overhead construction of 110 miles of electric railway in Minneapolis, and 89 miles in St. Paul. Resigning his position in December, 1891, to go south, he was appointed general manager and engineer of the Roanoke Street Railway Company in April, 1892. He built and equipped 22 miles of line. The company bought out the plant of the local electric light company and the latter came also under his charge. The lighting plant was rebuilt and its capacity was increased to 7,000 16-cp incandescent lamps and 250 arc lamps of the Edison and Thomson-Houston systems. He resigned his position with the Roanoke Company in August, 1894. During the following winter he was engaged in expert work in connection with several city plants, among the number those of Wilson, N. C.; Bedford City, Va., and Radford, Va. In March, 1895, Mr. Carr was appointed superintendent of construction of the West Chicago Street Railway Company, the position which he now holds.

Question of Pennies.

A suit has just been begun by M. Avizansky to recover damages from the North Chicago Street Railway Company, on account of his alleged ejectment from a car. In his complaint he alleges that he tendered the conductor of one of defendant's cars five pennies in payment of his fare, but the conductor refused to accept them. According to his story he was ejected from the car and his peddler's basket was thrown into the mud. It is well known that conductors look with little favor upon pennies, though they usually get rid of them quickly enough, but it scarcely seems probable that their objection would be strong enough to cause them to eject a passenger from a car because of a tender of fare in coppers.

Cable Road to be Sold.

The bondholders of the People's Cable Railway Company, of Kansas City, have applied to the United States Court for an order authorizing the sale of the property. The road is now in the hands of a receiver. The debt of the road is nearly a million dollars, in round numbers, and its net revenue is said never to have been sufficient to pay the interest on the bonds. It is usually from $6,000 to $12,000 behind at the close of each year's business. The road was built seven years ago by a company of which Robert Gillham, Charles L. Raymond and Charles L. Hutchinson, of Chicago, were the leading spirits.

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THE WESTINGHOUSE ELECTROMAGNETIC RAILWAY SYSTEM.

The Westinghouse electromagnetic railway system, of which we print a description in another column, presents an interest aside from its novelty, in being the first system of its kind taken up by one of the large street railway manufacturing companies. The time is particularly ripe for a street railway system that will obviate the objections against the overhead trolley construction, for the merits of electric traction are now so universally recognized that its adoption for urban purposes is merely a question of providing a system that will not deface the streets. The open conduit method is being put to a test on Lenox Avenue, in New York, and while the excellent results obtained in Budapest from practically the same system leave little doubt as to the outcome in the present instance, the expense which its construction entails offers abundant room for a competing system not thus handicapped; particularly as there is doubt as to the applicability of the latter under severe climatic conditions. The class to which the new system belongs has been a favorite one with inventors, and the only one of the kind that can be said to have had its principles tested by experiments on a considerable scale. A similar system was tested last year in New York City with very satisfactory results, and the present one has had its possibilities tried on an experimental line at Pittsburg and in actual service in Washington. That the Westinghouse Company should have taken it up would seem to imply that its practicability has been demonstrated and that the commercial stage has been reached.

TROLLEY PARTIES.

The electric lines of Philadelphia, extending far out in the delightful suburbs, naturally attract the patronage of those who ride in street cars purely for the pleasure of it. The trolley party seems to be more popular in that city than elsewhere, not merely because its railways pass through extraordinarily attractive territory, but rather because the local street railway companies are making unusual efforts to increase this class of traffic. It cannot be doubted that this policy is one of wisdom, for the income derived from the fares of the pleasure-seekers is likely to assume very handsome proportions before the close of the summer season. It is interesting to note the length to which the companies of Philadelphia go in their endeavors to make the trolley party an attractive amusement. The cars are decorated by colored lights and drapery, headlights are discarded and clusters of incandescent lamps take their place, while Chinese lanterns add to the attractiveness of the interior. As one of the local papers puts it, the "cars are a delight to the eye and make one think of a car of triumph in a carnival parade." With such provision to attract those who enjoy riding in the open air the trolley party should gain in popularity in Philadelphia, and the example set by the companies in that city may perhaps be followed to advantage by a vast number of electric railway companies in other cities. Philadelphia enjoys no monopoly of attractive suburban territory, and companies generally can discover in their shops the taste and ability necessary for the proper decoration of electric cars. The trolley party is an amusement which should be encouraged by the companies, and one of its best features lies in the fact that enjoyment of it is inexpensive.

SPEED OF ELECTRIC CARS.

During the last week or more we have noted that law-making bodies in a number of cities have been considering ordinances designed to regulate the speed of electric cars. The question is one of great importance, affecting the interests alike of the public and the companies. We trust that the mistake which has been made in Brooklyn is not to be repeated elsewhere. The reduction in the speed of the surface cars in that city has destroyed the value of the electric railway service to a point where it is little better than that afforded by the old-time horse cars. The result has been that the people have been vastly inconvenienced and are complaining bitterly of the action of the aldermen, while the incomes of the companies have materially suffered. The only gainers have been the elevated railways, which have attracted the traffic which the surface lines have lost. The protest against the existing schedule is so general that within a comparatively short time the ordinance must doubtless be modified so as to allow better rates of speed. In Brooklyn as well as elsewhere the adoption of regulations limiting the speed of electric cars to that of horse cars is a matter of bad faith on the part of municipal bodies. Where improved transit systems have been introduced there certainly has been an implied agreement that higher rates of speed would be allowed; otherwise an adequate reason for the expenditure of vast sums of money to make street railway service better and more rapid would not have existed. It is doubtless true that reckless motormen sometimes operate their cars at too high speeds, but this fact does not warrant councils in cutting down rates of speed to the horse-car schedule.

ELECTRICITY ON ELEVATED LINES.

The report which was in circulation last week that the Manhattan Railway Company had awarded the contract for the electrical equipment of its elevated system in New York City was premature, but an announcement to this effect in the near future will undoubtedly be correct. There is every reason to believe that the management has, to all intents and purposes, determined to operate the railway by electric power. The officers are now making an investigation to ascertain whether the substitution of electricity for steam is desirable, and there can be no doubt that the result will be a decision in favor of the new operating system. A visit to an electrical factory in the course of their investigation led to the rumor that a choice of apparatus had been reached. The introduction of electricity on the Manhattan system would, beyond a doubt, lead to a material reduction in operating expenses, as well as tend to make the service far more popular. Both considerations are calculated to have great weight with the management at the present time, as, owing to the active competition of the surface roads, the traffic has fallen off the last year, and the surplus has been reduced to a considerable extent. Were accurate figures obtainable from the Metropolitan Company, of Chicago, which operates the only electric elevated railway in the country, some idea could be gained of the economies likely to be effected by the introduction of electricity on the Manhattan, but the Chicago company is very close with its data showing the cost of operation. The officers say that the electric system has been in operation so brief a time that the present figures are likely to be misleading as well as unfair to the system. While they withhold figures they have made the general statement that a material saving has been effected in fuel, in comparison with the amount used on steam elevated lines. If this is true, there is a strong reason for the adoption of electricity by all elevated lines. At the same time, an important economy is worked in the labor account on the Chicago railway, as motormen are employed at $2.50 per day, instead of engineers at wages 40 per cent. greater. It is probably true that every elevated railway in the country is now seriously considering the adoption of electricity, and it is equally true that the sooner a decision in favor of an electric system is reached the sooner increased profits will accrue to the stockholders.

Trolley Currents and Railway Signals.

At the meeting of the Association of Railway Telegraph Superintendents, in Montreal, last week, G. H. Thayer, of Chicago, read a paper on "Trolley Currents and Automatic Signals." A trolley line, he stated, ran in close proximity to the Chicago & Northwestern for about five miles, the distance between the two roads ranging from 100 to 2,000 feet. The steam road is double-tracked and equipped with automatic signals operated by wire circuits. Tests with Weston instruments showed a difference of potential between rails varying from one half to five volts, and in a few instances the pressure ran up to 15 volts for a short time. The readings were taken about every 2,000 feet over the entire five miles. There was no part of the section tested that failed to show the presence of the leaking current. At two crossings the rails of the steam road had been insulated in the usual manner with wooden fish plates and fibre wedges, preparatory to changing the signals from the wire to track circuit, and over these fibre insulations a current would flow sufficient to bring a five-volt lamp up to candle-power and to melt a three-ampere fuse. No effect was noted on the wire circuit signals, but on one section, which had been fitted up with the track circuit (the signal being located near the crossing of the roads), the signal would go to danger upon the approach of a trolley car and then resume the clear position after the car had crossed and passed on some distance This action was accounted for on the ground that the trolley current was of opposite polarity to the signal current, thus devitalizing the signal magnet. While it may be true that, as a rule, a pair of wheels entering a section will short-circuit both the battery current and the stray trolley current, thereby throwing the signal to danger, yet under some conditions it might not do so completely, and a train might occupy such section with a clear signal behind it. Mr. Thayer thought the remedy lay in the adoption of the double trolley system.

Westinghouse Electromagnetic Railway System.

The stock of the Electromagnetic Traction Company, of West Virginia, has recently been purchased by the Westinghouse Electric & Manufacturing Company. The system owned by the former company is the invention of Malone Wheeless and is similar to one patented by Mr. Westinghouse, with which extended experiments have been made at the works of the Westinghouse Company, at East Pittsburg. A working model of the system, combining the ideas of both Mr. Westinghouse and Mr. Wheeless, has been on exhibition in the New York offices of the company.

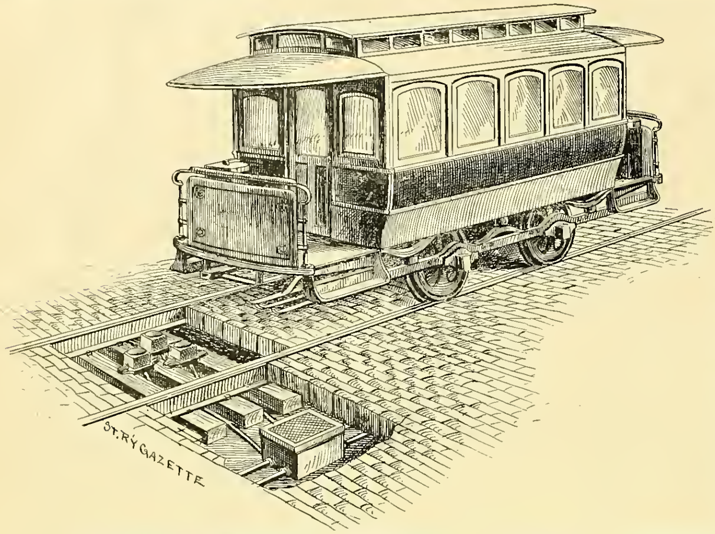


FIG. 1.—CAR AND TRACK CONSTRUCTION, SHOWING CONTACT POINTS AND SWITCHBOX.

The cost of construction of the system is claimed to be much below that of the ordinary cable conduit. The apparatus employed is simple and durable and can be applied to surface or elevated railways without altering the original roadbed. On surface roads very little excavation is required as none of the apparatus extends below the ties.

The power current is conducted through feeder cables carried in suitable conduits located just below the pavement by the side of or between the tracks and pass through switchboxes which are placed about seven feet apart.

The switchboxes, which are of cast iron, measuring 12 by 18 by 14 inches, each contain a magnet, with one winding of fine wire and one of coarse wire. The armature of the magnet is provided with two carbon contacts, each having a contact surface of about 2 by 2 inches, through which connection is made between the feeder wire and one of the contact pins. The magnets and their connections are secured to slate supports, the whole being so constructed that by removing the cover of the box and an inner case, they may be lifted out and examined without the aid of tools, the connections with the supply cable being made and broken automatically. Between the rails opposite the switchboxes are three contact pins of cast iron, each five inches in diameter and five eighths of an inch in height. The pins are set in terra cotta or granite blocks which in turn rest in cast-iron chairs having flanges by which they are bolted to the ties, and while extending sufficiently high to come in contact with collector bars carried by the cars, offer no obstruction to traffic. The construction of the switch boxes and contact pins is of a very substantial character and is designed to withstand the heaviest traffic. The cars carry three bars of T-iron, which are designed to slide over the iron contact pins and thereby make connection with the power current. Each car is provided with a three-cell storage battery, and as the car moves along and the collector bars slide over the contact pins, the current from the storage battery passes through the outer contact bar to the corresponding contact pin and thence through the fine wire winding of the magnet; as the armature is pulled up by the storage battery current, connection is made by the carbon contacts with the feeder cable. The power current passes through the coarse winding of the magnet, holding the armature securely in place, and thence to the motors through the inner contact pin and the corresponding collector bar. From the motors the current passes through the centre bar and third contact pin to the return cable, which is located under the pavement near the feeder cable. So long as the tracks are not occupied by cars, the contact pins are dead, and only become alive while the car is passing over them.

To provide against sparking in the switchboxes, the collector bars are of sufficient length to allow them to slide a distance of four feet over the forward set of contacts before leaving the rear set.

In double track work the switchboxes are located between the tracks, and are provided with two magnets, one for each track. The arrangement of its apparatus in the operation of elevated railways is slightly different from that of surface roads. In place of the contact pins, rails or metal bars, arranged 10 to 20 feet apart, will be employed.

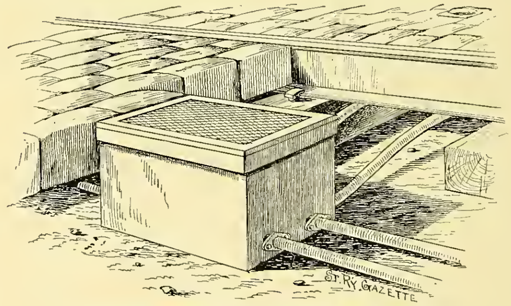


FIG. 2.—SWITCHBOX, FEEDER AND RETURN WIRES.

Jungfrau Electric Railway.

It is announced that all the preliminaries for the proposed electric railway up the Jungfrau, in Switzerland, have been arranged, and the construction is to be begun in the fall. The proposed line was described and illustrated in the Gazette in the issue of April 30. The railway is to be operated by the overhead trolley system with a rack rail between the tracks on the steep grades.

Some Practical Notes For Motormen.—IV.

BY GEORGE T. HANCHETT.

For the sake of a general agreement among electricians it has been decided to call the end or pole which repels the north end of the needle the north pole, and that which repels the south end of the needle the south pole, and that the line of force flows from south to north inside the magnet and back again from north to south outside the magnet.

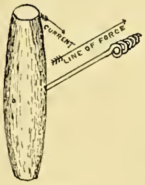


FIG. 10.

Our electric current flows from carbon to zinc in the wire passing around the magnet. A little experimenting will soon demonstrate that when the current is circling around the iron in the same direction as the rotation of a corkscrew being driven inwards, that the line of force has the same direction as the longitudinal motion of the corkscrew, see Fig. 10. We are now in a position to consider and understand well enough for our purposes, one of the essential parts of a railway motor. The rotating part of a railway motor is called the armature, and the stationary frame is called the field magnets, and it is the field magnets that we are about to consider. For the present, consider the armature as a mass of iron suitably wound with wire to produce rotation, but do not burden the mind with how this is done till the proper time. To consider intelligently anything, it must be done as in the case of the discontented pendulum, one part at a time.

If we observe a railway motor when it is taken apart, we shall find that there are presented to the circumference of the revolving part the ends of two or more magnets that are energized by bobbins carrying electric currents. It may be a matter of more or less difficulty to pick out and separate the various types of magnets used, and the following hints may be of assistance. We may consider the armature as a mass of iron and copper, against which are presented these polar faces, as in Fig. 11. These number of faces varies from two to six in railway motors. The method of placing coils and masses of iron relatively to these polar faces, so that the latter will pour a flux of magnetic lines into the armature, is a matter of design, and various inventors have produced results very different in appearance, but all depending on the same principle.

First, the pole-pieces are alternately north and south around the armature. This is accomplished by properly coiling the wire according to the corkscrew rule. Therefore, lines of force proceed from a north pole across the clearance space into the armature, and traversing the latter a short distance, enter the adjacent south pole and return through such magnetic masses as may be provided, to the north pole once more.

Second, every flux line must pass through an energizing coil supplying a magnetomotive force. It is possible to supply magnetic lines by permanent magnets without the use of magnet coils, but owing to serious objections, both of a mechanical and electrical nature, this is never done. Therefore, we may, for our purposes, consider the second requirement as necessary as the first.

The remaining figures of Fig. 11 are devoted to showing various methods of accomplishing these two requirements. Remember that it makes no difference where on the path of the flux line the exciting bobbin is placed, or whether there is one or more bobbins thereon, provided that the bobbins are connected so as to assist each other. There must be at least one on every magnetic line.

A historical discussion of the various types shown in Fig. 11 is both interesting and instructive. When railway motors were first built, No. 1 type was a very successful and common type of motor, and it was at once modified and inserted bodily under the car, the only change being to cast on a few knobs and ears for convenience in attaching. As a matter of fact, every manufacturing company simply took a successful type of motor of their make and remodelled it in the manner above indicated for railway use.

The result of this practice was in most cases the frequent return of the motors for repairs due to the fact that it was so exposed to mud and dust. To remedy this the motor was boxed in. This, however, adds to the weight of the motor. In fact No. 1, while giving excellent results as a stationary motor, makes a very inferior railway motor. No. 2 is better than No. 1 in that it has but one field bobbin. This is both cheaper to make and less liable to give trouble by grounds, etc. No. 5 is simply an extension of No. 2. It is better than No. 1 in that the armature moves in a more symmetrical field and it may be very compactly built. No. 6 was a great stride in advance of all existing types. The student will note that it is so formed as to protect its windings. It was one of the first ironclad motors to be applied to railway usage. Even then its advantages were not fully utilized and instead of flattening out the magnetic circuit to form a closed shell, iron boxing was used to protect the vulnerable sides. However, this fault was presently corrected in the type shown in No. 4.

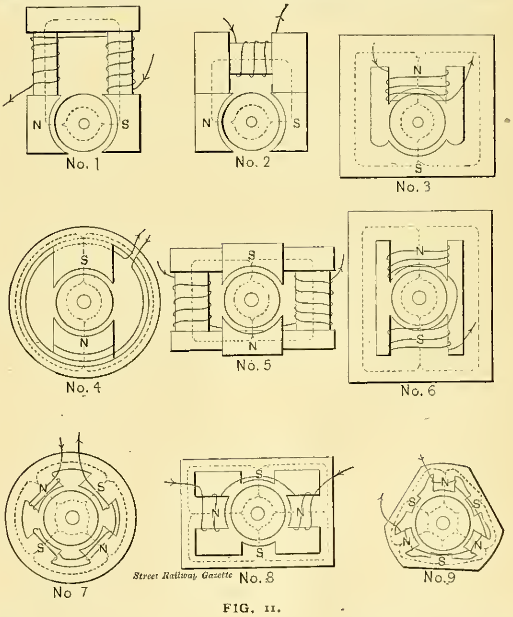


FIG. 11.

Type No. 3 was one of the first to be made with its magnetic circuit so modified as to form a closed shell. Imagine, if you please, that the iron circuit proceeding from *S* to *N* was completed over the ends as well as the sides of the armature, thus forming a cubical box. This was the construction that was followed. It has several advantages. First, the vital organs of the motor are protected by the magnetic circuit, and the necessity for extraneous protecting devices disappears. This makes the equipment lighter.

Second, the thickness of the magnetic circuit from pole-piece to pole-piece is much less. This is of no small importance when the limited space under the car is considered. Third, the protection is much more complete than that afforded by any method of boxing. A special advantage claimed for No. 3 is that due to the unsymmetrical field, the armature is lifted during operation and much dead weight on the bearings avoided. The simplicity of the single field coil is a decided gain. To offset this, a field of this nature requires the most careful design to secure sparkless running at the brushes. Nos. 7 and 8 are four-pole types which are largely used. A multipolar machine is always lighter than a bipolar machine of the same output. It can also be made more compactly and these are two very desirable points of gain. Nos. 7 and 8 each have a special advantage that about offset each other. The field of No. 7 is perfectly symmetrical, but No. 8 has fewer field coils to make and to get out of order. In addition, No. 8 has the advantage of being readily made to open without disturbing the continuity of the magnetic circuit. This type, moreover, readily lends itself to street railway work and can be arranged to be very convenient of access.

No. 9 is a six-pole type employed by a firm to produce a motor directly coupled to the one axle without the interposition of gears. The way in which this construction tends to accomplish the end desired will be discussed later.

No. 4 is a special type much used in small fan and stationary motors, but very suitable for railway work. It has but a single field coil, but is somewhat inconvenient to open for examination.

Before leaving the discussion of the field magnet for the present, one other thing deserves mention. We have spoken of magnetomotive force being supplied by the energizing coils, but beyond the conception that it is what causes the flux of lines, we have not a very definite idea as to its value. Magnetomotive force has a definite unit of measure known as the ampere-turn, that is, a magnetic circuit with ten turns of wire around it carrying 12 amperes, would have a magnetomotive force of 120 ampere turns. The product of the amperes and the turns of wire about the magnetic circuit give the magnetomotive force in ampere-turns. This we shall find useful later. The flux of lines resulting from any given magnetomotive force depends upon the magnitude of the latter, and also upon the magnetic resistance or reluctance that it has to encounter. In order to make this last small, the armature is built of the softest iron, the field magnets of steel, and the air gap between the two, which is of great magnetic resistance, is made as small as possible.

(To be continued.)

Baltimore Fender Cases.

The cases against the officers of the Baltimore street railway companies for failure to equip their cars with fenders, in accordance with the provisions of the local ordinance, were called in the Baltimore Criminal Court last week. Charges were preferred against the following: Wm. A. House, Jr., superintendent of the Traction Company; James Heyward, of the City & Suburban; Lawrence N. Frederick, of the Lake Roland Elevated, and Francis L. Hart, of the Baltimore City Passenger Railway. The court decided to dismiss the complaints upon the payment of costs, as it was shown that when the charges were originally preferred the companies were having the fenders built so as to comply with the ordinance.

Street Railway Mail Service in Brooklyn.

Postmaster A. T. Sullivan, of Brooklyn, N. Y., is an enthusiastic believer in the use of street cars for facilitating the distribution of mail. The system was introduced in Brooklyn a little over a year ago and the results have proved fully as advantageous as had been predicted. In a recent number of the *Independent* Mr. Sullivan refers to the system as follows:

"Just one year ago this month the Atlantic Avenue Railway Company, of Brooklyn, which had assumed the contract for carrying the mails to Coney Island, formerly held by the Brooklyn, Bath & West End Railway, asked that the government should extend their contract so that they could carry mails over another portion of the city. The postoffice inspector was sent from Washington to investigate the subject and conferred with me on what was best to be done. Some time before this I had been planning on a scheme for the increased use of postal cars on the city roads, with special reference to increasing the mail facilities for the outlying districts which, of late years, have been developing so rapidly. My plan was more extensive than any experiment of the kind that had heretofore been attempted. Railway officials were called in and a conference held in regard to the matter. Later on, the Atlantic Avenue Railway Company built two postal cars; they are painted white and lettered in gold. In the negotiations for carrying out the contract the company met the government more than half way. These new cars are specially fitted up as postal cars, and so arranged that the sorting and distribution of letters can be carried on in transit. A part of the plan, which was carried out before the introduction of postal cars, was that the government should contract with the various railway companies for transporting the letter carriers and the collectors of mail, a fixed sum being given therefor. In this way we could do away with the paying of carfares for our help in their frequent journeys to and from the main office, or paying in tickets, which they had been in the habit of doing. The amount of money spent for this purpose was unusually large, in one year amounting to over $14,000. The postal car, as it is now in use in Brooklyn, is of the size of the ordinary street car usually found in our large cities There are eight windows on each side. A wooden partition divides the apartment in the centre, leaving four windows for the front portion and four for the rear. The front portion is used by passengers as a smoking apartment. A seat runs around three sides of this division, and there are accommodations for about 20 passengers, including standing room. At the present time the needs of the postal service only require one-half of the car, and, under the arrangement described, the railway company is able to derive an income from the passenger portion of the car, an amount sufficient, I believe, to pay the running expenses of the car and a trifle over.

"One postal clerk rides in each car. It is his duty to face, separate and distribute the mail, a case with the necessary number of pigeon-holes being furnished for that purpose. While the car is in transit he drops into mail bags the matter assigned to the different stations. On his return trip to the central office he has all the letters sorted in different bags ready to be transported out of the city. During the journey of the car the bags are received through an open window on each side of the car and deposited in the same manner. In his compartment this mailing clerk is as isolated and free from interruption as is the postal clerk on the large postal cars that run across the country. Three trips are made every day. The first trip was made Aug. 8, 1894, in charge of a mailing clerk from the mailing division of the main postoffice. There is no doubt that this system will revolutionize the delivery of the mail in our large cities, especially in those having many small outlying towns and villages, or near wards that are being added to the city proper. The system will have the effect of providing postal facilities to these suburban and semi-suburban localities which will be second only to those that the residents of the city proper enjoy. It is within only a comparatively few years that railway cars have been utilized by the postoffice for other than transportation purposes. The first experimental railway car on steam roads was a very crude contrivance compared with the magnificent and well-appointed car of to-day; it was run from the old depot of the Harlem road, Thirtieth Street and Fourth Avenue, New York, to Washington, on July 9, 1868.

"This new service has resulted in giving increased and better postal facilities to such outlying towns as Bensonhurst, Bath Beach, Coney Island and generally to the outskirts of the city that are through the increased railway facilities furnished by the trolley and elevated systems rapidly being occupied. The city is peculiarly well situated for the successful operation of this scheme, because all the street car lines converge at a point near the postoffice. The success of the experiment, so far as it has gone, is well assured. One important result has been that it has facilitated the transportation of registered mail matter. Under the old system such packages were sent in pouches, which were carried by mail clerks on the front of ordinary cars. Under the new system such packages are placed in charge of the postal clerk on the trolley car, and are, of course, much less liable to get lost than they were before. The experiment, now, however, no longer experiment, has attracted the attention of postal officials in other large cities who have paid visits to Brooklyn to study the working of the system with the view of introducing it into their own cities.

"Under this new system of carrying the mails on the city railways, what would be the effect of a strike on the part of the employees of the road? In such a case the responsibility of carrying the mails rests with the company. In the case of a strike it is the duty of the companies to see that their lines are not blockaded. In case of trouble they must look to the municipal and State authorities for whatever assistance they require. In the event of the failure of such aid they can apply to the United States Government, through the postoffice department, for assistance. But, under no circumstances, would strikers be allowed to interfere with the running of the United States mails. The men who run the postal cars are sworn agents of the government, and must be respected as such. The companies must keep their lines open, at least for the running of these postal cars. It is proper to say that during the recent great strike on the trolley lines in Brooklyn the strikers did not interfere with the running of the cars containing the mail which, during that troublous period, was delivered as regularly as in ordinary times."

No Tie-Up in Boston Probable.

A Boston paper states that all rumors to the contrary notwithstanding, no tie-up on the West End Railway, of Boston, is probable, as there is too large a conservative element among the motormen and conductors.

Comment and Views of Contemporaries.

Rapid Transit Demanded.—The people of the large cities will not consent to abandon rapid transit. Its advantages are so great and it proves such a blessing to all classes of people that a general protest would at once go up if the street car companies went back to the snail-like pace of a few years ago. Rapid transit is creating a revolution in city life. It is distributing the formerly dense populations of the cities over broader areas of territory, thus adding to the health and comfort of the people and prolonging the lives of men, women and children.—*Toledo Commercial.*

What the Trolley System Has Done.—It is possible, now, for a working man to occupy a comfortable and healthy new dwelling, however distant from his place of employment, and still reach his work in time. Moreover, the daily ride to and fro on the street car has been relieved of a great part of its former horror. The cars are large and comfortable, and they move not only swiftly but smoothly, without the jolting and the jingling that made the horse cars a terror, so that the saving of wear and tear upon the nervous system is in itself an enormous consideration.—*Philadelphia Times.*

Rapid Transit Expansion in Baltimore.—A director of the Baltimore City Passenger Railway Company, in a published interview about five years ago, ventured the assertion that rapid transit could not be made to pay. His view of the case was that appliances were in such an unfinished state and the cost of introducing new motive power was so great that to abandon horse cars would be a very precarious undertaking. He expressed the belief that Baltimore would never follow Pittsburg, Kansas City and Boston in their venturesome experiments. If that man is alive to-day, the experience of the past five years must have been a revelation to his pessimistic nature. Rapid transit has not only come, but it has descended in a deluge, so to speak. The old systems of street railways, where cars were propelled by animal power, have been so effectually superseded that everybody wonders why our city was so slow in breaking with tradition and adopting the new appliances. Every line has also been lengthened, and five people ride on the street cars where one did in the old days, when it took 35 minutes to make the trip from North Avenue to Baltimore Street.—*Baltimore Herald.*

Passing of the Cable in Philadelphia.—The cable system has been in use in this city but a little over ten years, so that the cost can be placed at $1,000,000 a year. And yet when it was first introduced here it was looked upon as the ideal plan, and one which was destined to supersede all other methods of surface street car propulsion. Ten years ago the writer was present in the office of a street car line in this city when the officials of what was then the old Union line proposed the cabling of the road. The president of the company to whom the offer was made was a shrewd and discerning individual. To his visitors he said: "Gentlemen, here are pencil and paper; now figure out what the cabling of the road will cost, and in how many years it will pay for itself." The Union line magnates consulted for several minutes, made a number of calculations, and then placing the cost at $1,000,000, estimated that it would pay for itself in ten years. "Then, gentlemen," was the reply, "this company doesn't want any cable. In less than ten years a much better and cheaper system will be found. Before ten years you'll be digging up your cable and be glad to get rid of it."—*Philadelphia Item.*

FINANCIAL NOTES.

CONSOLIDATION TALK IN BALTIMORE.—President Brown, of the Baltimore Traction Company, denies that there is any truth in the rumor that that company and the City & Suburban Company, of Baltimore, are to be consolidated.

RECEIVER ASKED FOR IN LOGANSPORT.—Mrs. Mary Catherine Dear, who recently was given judgment for $3,000 against the Logansport Street Railway Company for injuries, has applied for the appointment of a receiver for the company on the ground that it is insolvent.

CATONSVILLE SHORT LINE SOLD.—The Catonsville Short Line Railway, a branch of the Baltimore & Potomac Railway, has been acquired by the Edmondson Avenue, Catonsville & Ellicott City Electric Railway Company, which constitutes a portion of the Baltimore & Washington Boulevard electric line.

EARNINGS OF THE BUFFALO RAILWAY COMPANY.—The net earnings of the Buffalo Railway Company for the month of May were $74,667, an increase of $14,938 compared with those of the corresponding month of 1894. For 11 months ending May 31, 1895, the net earnings were $676,576, an increase of $94,706 compared with those of the corresponding period of 1894.

THE CANADA SWITCH MANUFACTURING COMPANY, Limited, of Montreal, has purchased the business, etc., of K. W. Blackwell. This amalgamation of interests has enabled this company to improve its position in many ways. The company has obtained authority to change its title to the Canada Switch & Spring Company, Limited. The business will be under the same management as before.

INCREASE OF STOCK IN PHILADELPHIA.—At a meeting of the directors of the Electric Traction Company, in Philadelphia, last Wednesday, it was decided to increase the capitalization to the full amount authorized, $8,750,000, by the issue of 22,604 additional shares, of a value of $50 each, to which the stockholders will be entitled to subscribe in the ratio of one share and a small fraction of a share for each seven shares of present holdings.

KANSAS CITY CONSOLIDATION.—The Kansas City *Journal* says in regard to the street railway consolidation in that city: "The reorganization of the two systems, bringing both under one management, cannot be regarded as in any sense in conflict with the law against the consolidation of competing lines of transportation, for not only are the various routes non-competing, but the consolidation will be a direct benefit to the public by adding to the conveniences already afforded. And the management of the great system will have the fullest confidence of the public."

PETITIONS TO INCREASE STOCK.—The Lynn & Boston Railway Company has presented two petitions to the Massachusetts Board of Railway Commissioners for the privilege of increasing the capital stock of the company. One petition comes from the directors of the road, and asks for permission to issue additional shares to the number of 1,154, at a par value of $100, which would raise the sum desired for necessary improvements—$115,400. Most of this money would be used entirely for rebuilding the roadbed. Most of the line of the Lynn & Boston, which is used by the heavy electric cars, is built of the same light material that was used when horse cars were in service. The second petition is based on Chapter 517 of the acts of 1894, which gave the road the right to increase its capital stock $3,000,000 over the present amount—$1,000 000. It asks for the privilege of increasing the capital stock by 485 shares, for the purposes of defraying necessary expenses.

ELECTRICITY ON THE ALLEY ELEVATED, CHICAGO.—An officer of the Alley Elevated Railway, of Chicago, is quoted as saying that there was no probability that the company would be consolidated with the Metropolitan West Side Elevated. He made this statement in reference to the rumored change of motive power on the road: "We have discussed it for a year or more and have had estimates of what the change from steam to electricity would cost. We have had no estimate recently, but to the best of my recollection the change could be made for about $500,000. We have the ground on which to erect a plant; the building would not cost much, the principal expense would be the dynamos and motors. Perhaps we could dispose of the engines we are now using. We are only waiting to take formal action for a demonstration of results on the Metropolitan. Electrical contractors heretofore would guarantee nothing. The Metropolitan is yet an experiment, because the road has not yet been fully opened. It is asserted that the operating expenses can be reduced to 40 per cent. with all the lines running. If this proves to be true there can be no question that electricity will become the motive power of all elevated roads. The change will not be expensive. All that si needed will be an extra rail, building, dynamos and motors. The saving of coal is of itself a great item. I have visited the plant of the Metropolitan and find that they have reduced economy to a science; the consumption of fuel is fixed at the minimum."

TWO WASHINGTON ROADS SOLD.—The Philadelphia Street Railway syndicate, composed of W. L. Elkins, P. A. B. Widener and Thomas Dolan and others, which bought the controlling interest in the Belt line and the Eckington and Soldiers' Home railways, here in 1893, have sold out their holdings in the roads to the Baltimore capitalists whose former interest in the properties have been represented by President Newbold. The latter gentlemen are said to be largely interested in the building of the proposed Boulevard Electric line between Washington and Baltimore, for which contracts for its complete construction before June 1, 1896, are about to be awarded, and it is stated that they bought the controlling stock of the Belt and Eckington companies in order to provide plentiful means of communication with every part of Washington when the Boulevard road is finished. It is said, says the Washington *Star*, that the Philadelphia syndicate received something over a million dollars for the stock disposed of, but it is believed in well-informed circles that no actual money changed hands, as it is well understood that Messrs. Widener, Dolan and Elkins are largely interested in the Boulevard enterprise. This is all the more apparent, from the fact that W. Kesley Schoepf, who has represented the Philadelphia interests as vice-president and general manager of the Eckington and Belt systems, holds the same important position with the Washington & Maryland Railway Company, which is about to construct the Boulevard electric line to Baltimore.

NEW INCORPORATIONS.

PORTLAND, ORE.—The Portland Suburban Railway Company has been incorporated with a capital stock of $2,500,000 The promoters are Jas. M. Lively, Ezra D Baker, Portland, Ore.; L. D. Lively, of Athena, Ore.

ERIE, PA.—The Erie, Reed Park & Lakeside Street Railway Company has been incorporated to build an electric street railway in Erie, Pa., by Chas. M. Reed, F. F. Curtze, Harry L. Moore, Erie, Pa. The capital stock is $50,000.

ERIE, PA.—The Erie & Eastern Street Railway Company has been incorporated with a capital stock of $25,000 to build an electric street railway in the city of Erie, Pa. The promoters are Harry L. Moore, F. F. Curtze, and C. M Conrad, Erie Pa.

TOLEDO, O.—The Toledo & Bay Shore Railway Company has been incorporated with a capital stock of $25,000 to build and operate a street railway in and about Toledo, Ohio. The promoters are Erskine L. Potter, William L. Hoyt, Franklin Hubbard, Frederick Bissell.

ERIE, PA.—The South Shore Street Railway Company has been incorporated with a capital stock of $100,000 to build an electric street railway in North Esat, Pa. The promoters are L. I. Chase, Buffalo, N. Y.; E. M. Ketcham, North East, Pa.; Frank McLaughlin, North East, Pa.

CHICAGO, ILL.—The Central Elevated Railway Company has filed articles of incorporation with a capital stock of $7 500,000. The incorporators and first board of directors are Robert D. Sheppard, E. Hamilton Hunt, Dwight Lawrence, Seneca D. Kimbark and F. F. Donnell.

KINSMAN, O.—The North Trumbull Rapid Transit Company has been organized in Trumbull County for the purpose of building an electric railway for both freight and passenger traffic, from Kinsman to Mesopotamia, where it will connect with a projected line to Cleveland.

NEWS OF THE WEEK.

GRAND HAVEN, MICH.—The new street railway is being rapidly pushed toward completion.

JACKSON, MICH.—The street car line is to be extended to Vandercook's Lake at a cost of $35,000.

FORT LEE, N. J.—The township committee has granted a franchise to the Bergen County Traction Company.

CHICAGO ILL.—Work on the downtown extension of the Lake Street Elevated Railway commenced this week.

GAINESVILLE, GA.—D. E. Evans and others are organizing a company to build an electric line in the city and suburbs.

CHICAGO, ILL.—Mayor Swift has vetoed the ordinance giving a franchise to the Calumet & Blue Island Railway Company.

CARTERSVILLE, MO.—The Fitch Electric Railway Company has received permission to build an electric road in this city.

WATKINS, N. Y.—The Dix Town Board has granted a franchise to the Watkins & Havana Electric Street Railway Company.

PITTSBURG, PA.—The Homestead & Highland Street Railway Company, it is said, is shortly to extend its line to enter Braddock.

LITTLE ROCK, ARK.—J. H. Healey and others have asked for a franchise to construct an electric line along several of the city streets.

DALLAS, TEX.—It is announced that the Dallas & Oak Cliff Railway has completed arrangements to extend its road to Fort Worth.

MONONGAHELA CITY, PA.—Monongahela City is to have a new street railway, the builders to be William F. Lloyd and J. W. Lloyd.

PHILADELPHIA, PA.—The ordinance permitting electric light wires to be attached to trolley poles has been defeated in the Common Council.

DOVER, DEL.—The Council has granted the proposed Milford-Dover Electric Railway Company the privilege of laying tracks and erecting poles.

WESTPORT, MO.—The Westport Council has granted a franchise to the Kansas City Electric Railway, giving it also the right to furnish heat and motive power.

MILWAUKEE, WIS.—An ordinance has been introduced in the Common Council providing that all electric cars shall be equipped with fenders before Oct 1

INDIANAPOLIS IND.—The hearing in the case of the Citizens' Street Railway Company against the city has been postponed by Judge Baker until September.

PHILADELPHIA PA.—The Council sub-committee on street railways has decided to postpone further consideration of the Cayuga Street railway trolley extension.

ST. JOHNS, N. B.—Tenders are being asked for the St. Stephen & Milltown Railway, which will connect the Shore Line Railway with the St Croix & Penobscot.

AUSTIN, TEX.—The Dam Boulevard Railway Company has secured permission to erect its poles and wires. It will secure water power from the Colorado River dam.

LITTLE ROCK, ARK.—W. S. McKain, P. W. Crawford and E. W. Milhall are interested in the Boulevard Street Railway, which will be about three and one half miles long.

OSHKOSH, WIS.—The Oshkosh Street Railway Company has secured an injunction restraining the Central Wisconsin Electric Company from interfering with its tracks.

MILWAUKEE, WIS—Judge Jenkins has given the receivers of the Milwaukee Street Railway Company permission to extend the National Avenue line to the State Fair Park.

MONTREAL, QUE.—The Incline Railway Company will apply to the City Council for permission to build an electric railway across the summit of the mountain to the two cemeteries.

PHILADELPHIA, PA.—One of the Council's committees has reported favorably on the ordinance compelling street railway companies to slacken the speed of cars when passing school houses.

CLAREMONT JUNCTION, N. H.—Steps are being taken looking to the establishment of an electric line of cars from Claremont Junction through West Claremont to Newport and Sunapee Lake.

HARTFORD CITY, IND.—The matter of building an electric railway nine miles long to connect Hartford City and Montpelier is being agitated. J. P. McGeath, of Hartford City, can give information.

SHEBOYGAN, WIS.—The Sheboygan Consolidated Street Car Company has contracted with C. E. Loss, of Chicago, for the construction and equipment of 11 miles of electric railway, to be finished within 60 days.

McKEESPORT, PA.—The contract for the construction of the Carnegie, Mt. Lebanon & Castle Shannon Electric Railway has been awarded to Fred Gwinner, of Allegheny City. Ground has already been broken.

SYRACUSE, N. Y.—One hundred and fifty Italians employed by Belden & Seeley in relaying and ballasting the tracks of the Syracuse Street Railway Company last week struck for an increase of their pay from $1 to $1 25 a day.

NEWARK, N. J.—At a meeting of the Bloomfield township committee an ordinance passed its first reading, calling for a double track electric road from the city line to the present terminus of the horse-car road on Bloomfield Avenue.

BROOKLYN, N. Y.—The hearing on the appeal of the Nassau Electric Railway Company from the decision of Judge Smith declaring its franchises granted by the Board of Aldermen null and void took place in the General Term in Brooklyn last week.

CINCINNATI, O.—R. J. H. Archible, John Rempy and others are among the incorporators of a new company which is going to construct an electric line from the end of the Norwood or Hyde Park lines to the Oakley race tracks. The capital stock is $10,000.

WOODBURY, N. J.—At a meeting of the City Council last week the ordinance committee was instructed to frame an ordinance enforcing the clause in the franchise of the trolley company which limits the rate of speed through the city at eight miles per hour.

BOSTON, MASS.—The West Roxbury & Roslindale Electric Street Railway Company has elected the following officers: Clifford Devens, president; William P. Whittemore, treasurer; J. Halstrick, T. H. Dunham, Charles H. Wise, George J. Morse and Charles G. Davis, directors.

NEW YORK, N. Y.—Mayor Strong has vetoed the franchise giving the Third Avenue Railway Company the right to construct a line on the Kingsbridge route. The ordinance as framed by the Council does not furnish equal opportunities, he holds, for compelling corporations to bid for the franchise.

CHICAGO, ILL.—The Chicago General Electric Railway Company has prepared an ordinance for the construction of Brandenburg underground conduit lines on the south side from Monroe and La Salle Streets south to 65th and 69th Streets, with diversions east and west to Madison Avenue and Wright Street.

BROOKLYN, N. Y.—A delegation of street railway officials visited Mayor Schieren last week and asked him to use his influence to secure a modification of the ordinance that limits the speed of electric cars to six and eight miles per hour. The incomes of all the companies have been materially reduced by the regulation.

PORTLAND, ME.—The railway commissioners have refused to confirm the location of the tracks of the Cape Elizabeth Street Railway Company, because the exact locations are not clearly specified and that the double-track system along narrow roads and streets would be unfair to the town people and traveling public.

BELFAST, ME.—It is announced that Messrs. Perkins and Colby, of Berlin, N. H., propose to construct and operate an electric railway under the franchise of the Waldo Street Railway Company, which gives it the privileges to construct a road from Stockton Springs to Camden, including the right to build a bridge across tidewater in Belfast Bay.

GLOVERSVILLE, N. Y.—The following officers have been elected by the Gloversville & Broadalbin Railway Company: President, John H. Richardson of Gloversville; vice-president, Dr. H. C. Finch, of Broadalbin; secretary and treasurer, Frank Burton, of Gloversville; superintendent and engineer, J. Wallace Cleveland, of Broadalbin.

NEW YORK, N. Y.—The railway committee of the Board of Aldermen has reported in favor of confirming the contract between the People's Traction Company and the Westchester & Connecticut Traction Company, by which the former company agrees to carry passengers to Westchester for one fare if it secures the franchise that it asks for in the annexed district.

KANSAS CITY, MO.—Judge Philips in the United States Circuit Court has entered a judgment for $68,004 against the Metropolitan Street Railway Company, of Kansas City, in favor of the Pullman Palace Car Company, of Chicago. The judgment is for the value of 25 cable cars made for the old Metropolitan Company by the Pullman Company about six years ago, together with interest on the debt.

EAST BRIDGEWATER, MASS.—The officials of the Brockton Electric road have accepted the franchise for a road to East Bridgewater from Brockton, and have filed a bond of $2 000 agreeing to have the road completed within one year. The road will run from Brockton to East Bridgewater by the way of Central Street and thence through Satucket to Bridgewater by Bedford Street, unless the plan is changed.

CHICAGO, ILL.—The Chicago Central Subrailroad Railway Company has applied to the Council for a franchise to build a downtown tunnel railway to connect the several elevated railways. It is contemplated that the tunnel shall be used by the surface and elevated roads which will enter at the border or boundary of the crowded downtown district, make the circuit of the underground loop, discharging its passengers to the streets.

ALBANY, N. Y.—It is announced that the Albany Railway Company has decided not to honor the certificates of the mayors of Albany and Troy, prepared under the new law and permitting policemen and firemen to ride free on the cars. It proposes, it is said, to test the constitutionality of the law passed by the legislature last winter, compelling all surface and elevated railway companies to carry free any policemen or firemen on presentation of a certificate signed by the mayor of a city or the president of a village.

HARRISBURG, PA.—Attorney General McCormick has asked for a writ of quo warranto compelling the Montgomery Avenue & Berks Street Passenger Railway Company, of Philadelphia, to appear in court and show cause why its charter should not be forfeited, because it has not complied with the law pertaining to the granting of charters to street railway companies. Similar writs were granted against the Cambria & Somerset Street Railway Company, the West Girard Avenue Passenger Railway Company, the Aramingo Avenue Company, Fairhill Passenger Railway Company and the old York Road Railway Company, all of Philadelphia.

CHICAGO, ILL.—Judge Horton has granted an injunction on the petition of John W. Doane, restraining the Lake Street Elevated Railway Company from building its elevated structure on Lake Street, near Wabash Avenue. The Lake Street company subsequently filed a $100,000 damage suit in the Circuit Court against J. W. Doane. In its declaration the company avers that it is building its road under an ordinance passed Oct. 1, 1894, which, it says, was a valid ordinance and accepted by the plaintiff. It declares the injunction obtained by Doane was secured with the intention of injuring its credit and for the purpose of harassing it in the construction of its road.

BRATTLEBORO, VT.—Chancellor Rowell has refused the injunction petitioned for by the Estey Organ Company and ex-Governor Levi K. Fuller to restrain the Brattleboro Street Railway from using electricity as a motive power and from extending its line in the village of Brattleboro. Judge Rowell gave as his reason for refusing the petition that the railway had a right to use electricity as a motive power, that the preliminary steps had been taken, as required by the statutes, and that the building of the street railway as proposed constituted no additional burden on the soil. The work of building the road will now be pushed to completion.

PERSONAL.

MR. GEORGE W. HOMMELL has resigned as superintendent of the Milwaukee Street Railway Company.

MR. J. HENRY CARSON, of the Sterling Supply & Manufacturing Company of New York, was married on June 6 to Miss Helen Willets, daughter of Mr. John T. Willets, at the home of the bride's parents, at Rye Neck, N. Y.

TRADE NOTES.

B. J. LAUNIERE, formerly of the Grand Rapids Machinery & Electric Company, has recently been employed as travelling salesman by the Metropolitan Electric Company, 186-188 Fifth Avenue, Chicago. Mr. Launiere is a man of ability, well liked by the trade and is meeting with great success in the sale of electrical supplies.

ROPES FOR TRANSMISSION PURPOSES.—The Niagara Falls Hydraulic Power & Manufacturing Company, of Niagara Falls, N Y., has recently installed a rope drive which requires 2 550 feet of Hunt "Stevedore" rope This is a splendid rope for transmission purposes, and is made exclusively by the C. W. Hunt Company, New York City.

LARGE GENERATOR CONTRACT.—The West End Railway, of Boston, has recently placed an order with the General Electric Company, covering two 800 kilowatt two 1,300 kilowatt and one 1,500 kilowatt generators, all to be directly connected to the engines This is one of the largest orders for railway generators ever placed at one time, and was secured on the merits of the machines only.

Record of Street Railway Patents.

UNITED STATES PATENTS ISSUED JUNE 11, 1895.

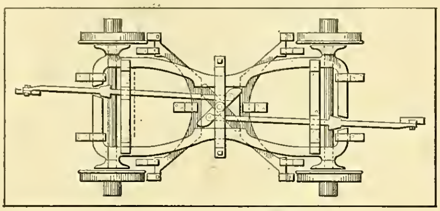
540,632. CAR FENDER; Edwin M. Carhart, Providence, R. I.; filed Oct. 5, 1894. Pivotally mounted bars are provided with grooves or ways each having attached to it a tube with a spiral spring in it. The fender has on each side a rod adapted to enter the tube so as to compress the spring. A device is provided to hold the springs in compression, but when moved, releases the springs to impel the fender along the bars.

540 644. FENDER ATTACHMENT FOR STREET CARS; Eliseo Del Valle, Brooklyn, N. Y., assignor of one half to Augustus R. O. Schabbehar, same place; filed Aug. 2, 1894. The attachment comprises an upright main frame provided with forwardly bent arms at its upper end and guide lugs at its lower end. Side arms are provided which are spring actuated and laterally swinging. The fender frame which is spring-actuated is fulcrumed to the forward extending arm of the main frame. A transverse bar is pivoted to the lower part of the main frame and forwardly extending guard arms are applied to the bar. A flexible guard cord extends over the front ends of the forwardly extending arms and a fender net is stretched on the main and fender frames and connected to the outer end of the side arms. Means are provided for locking the fender frame and the side arms close to the main frame and for releasing them when an obstruction strikes the guard cord.

540,653. SUPPLY SYSTEM FOR ELECTRIC RAILWAYS; Oscar A. Enholm, New York, N. Y., assignor, by mesne assignments, to the Electromagnetic Traction Company, Washington, D. C.; filed Nov. 3, 1891. A plurality of distributing feeders is connected to a main feeder and a return rail on the roadbed. A series of exposed contacts is arranged along the road with an accessible electromagnetic circuit controller between each one and the main feeder. The controllers for a given section are arranged in close proximity to each other with connections by which they may be operated by currents from the main feeder or lead.

540,664. ELECTRIC RAILWAY; Sebastian Hoeninger, Milwaukee, Wis.; filed Aug. 15, 1894. In an electric railway system this is the combination of a suspended yoke, an insulated hanger central of the same, insulators pivoted to the ends of the yoke, and trolley wire sections secured to the pivotal insulators to normally lap each other in the insulated hanger.

540,665. FARE RECEIVER; Stephen C. Houghton, San Francisco, Cal.; filed Aug. 18, 1894. The fare receiver extends longitudinally in the car and has one or more deposit slots and a bottom hinged to the receiver.



NO. 540,829.—CAR BRAKE.

540,666. COIN OR TICKET ACTUATED LOCK; Stephen C. Houghton, San Francisco, Cal.; original application filed Aug. 18, 1894; divided and this application filed Dec. 5, 1894. This is a mechanism used in connection with the fare receiver mentioned in the previous patent. The fare receptacle has a deposit slot and there is a lock in the path of the circuit closer. The latter is released by the dropping of a coin or ticket and reset by the movement of the circuit closer.

540,685. ELECTRIC BRAKE; William B. Potter, Schenectady, N. Y. assignor to the General Electric Company, New York; filed March 9, 1895. A controlling switch, a reversing switch and a brake switch are provided with interlocking mechanism between them. Means are arranged to vary the throw of the brake switch in accordance with the changes of position of the reversing switch.

540,733. FENDER FOR CARS; Ernst Gerstenberg and Herman Barghausen, Washington, D. C.; filed Nov. 22, 1894. The main fender consists of curved side-bars connected by cross-bars and provided with netting. It is supported in its normal position on a notch in a spring trigger which is actuated by a rod attached to a lug. The lug is secured to a pivoted shield and is actuated by a vertical rod.

540,796. RAILWAY SWITCH WORK; Arthur J. Moxham, Johnstown, Pa.; filed March 30, 1894. The switch structure comprises a body portion having diverging rails secured thereto and a pocket which is adapted to receive a plate. The plate in the pocket has flanged ways and a point is formed upon them. There is retaining material between the plate and the pocket so that the former is held in position.

540,829. CAR BRAKE; August Fischer, Chicago, Ill., assignor of one half to Johann G. Eggers, same place; filed Feb. 26, 1895. The brake mechanism has yoke-shaped brake beams which carry brake shoes adjacent to the inner surfaces of the car wheel. A rotary wedge bar extends between the brake beams and means are provided for turning the bar so as to wedge it between the beams. (See Illustration.)

540,830. SAFETY APPARATUS FOR STREET CARS; August Fischer Chicago, Ill., assignor of one half to Johann G. Eggers, same place: filed Feb. 26 1895. This apparatus is designed for use on grades. A supplemental toothed rail extends parallel with the track rail. The car is provided with safety apparatus which comprises a rock-shaft journaled in the bearings at opposite sides of the car and furnished with an operating lever, means being provided for locking the lever at the end of the throw. On the shaft is a crosshead to which tongues are pivoted near its opposite ends and sockets, each of which is pivotally fastened below a tongue-pivot to extend from its pivotal point to one side of that of the tongue. The sockets afford self-adjusting guides through which the tongues project so as to be extended and retracted longitudinally with relation to the roadbed by means of the lever.

540,831. CAR TRUCK; Charles Fitzgerald, Pittsburg, Pa.; filed Oct. 23, 1894. This is a combination with the car body of running gear, a pair of equalizing levers, pivotally connected at their outer ends to the car body and their inner ends terminating in geared forks intermeshing with each other. The levers are fulcrumed at intermediate points and guides are attached to the inner ends of the levers adapted to work vertically in suitable ways. There is a group of springs between the inner ends of the levers and the car body and a group of supplemental springs is located below the equalizing levers and between the fulcrum and the outer ends of the levers.

540,867. LIFE GUARD FOR STREET CARS; Wahlfrid A. Nelson, New York, N. Y.; filed Dec. 5, 1894. The guard consists of bars having wheels at the front to run on the rails and at the rear pivoted for vertical play to an intermediate frame. The latter is also pivoted for vertical play, its pivot being carried on the horizontally oscillating frame pivoted to the bottom of the car. There are springs between the frame and the intermediate frame. The latter frame bears on the wheel carrying bars which have a receiving apron on the front portion.

540,883. TROLLEY; William E. Steinbach, Philadelphia, Pa.; filed April 6, 1895. The trolley is formed with auxiliary rollers which are adapted to engage with the trolley wire. A crank arm separates the rollers and permits them to become disconnected from the wire.

540,894. CAR GUARD; Charles A. Barrett, Malden, Mass.; filed Feb. 26, 1895. The fender projects in advance of the car and is supported in a raised position so that it avoids contact with the track, passes over a prostrate human body and catches a person who may be encountered in a standing position. A hinged guard is located between the fender and wheel and a locking device holds the guard in a raised position. A latch-displacing trip is located below the lowest part of the fender and is adapted to encounter and be operated by a body over which the fender has passed. The guard-releasing devices are controlled by the attendant on the car.

540,900. CONDUIT ELECTRIC RAILWAY; David Brooks, Jr., Philadelphia, Pa.; filed June 9, 1892. This is a slotted conduit with a continuous conductor carried by an insulated support on hangers. On the continuous conductor there are insulating strips on which is a sectional conductor with separated ends; pieces connecting the ends of the sections and the continuous conductor. A receiver with a chain connected to it and adapted to make contact with the sectional conductor is connected with the car.

540,901. CONDUIT RAILWAY CONDUCTOR; David Brooks, Jr., Philadelphia, Pa.; filed Feb. 27, 1892; renewed Dec. 8, 1894. The conductor is formed of two wires with insulating material between them, one being continuous and the other of separated sections, the two being connected by fusible material.

540,927. PICK-UP CAR FENDER; Eldridge J. Smith, Washington, D. C.; filed March 4, 1895. The fender is composed of a series of inherently elastic fingers which extend from the oscillating or rocking carrying bar or beam. A buffer composed of a plurality of inherently elastic fingers made of wire and bent into U-shape are secured to the bar or beam hanging down in front thereof.

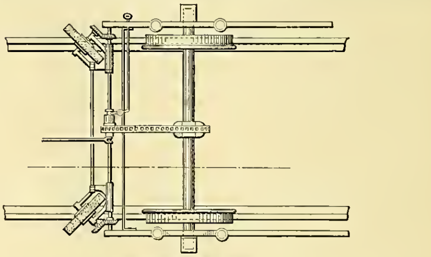
540,973. CAR FENDER; Thomas W. Gilmer, Lynchburg, Va., assignor of one half to Thomas D. Tate, same place; filed April 17, 1895. An outer frame is pivotally attached to brackets on the car and a shorter frame is pivotally attached to the other frame and is adapted to be latched by engagement with the brackets. Over the frames is a flexible apron and two springs elevate the outer frame when unlatched.

541,019. ELECTRIC WIRE LOCK AND SUPPORT; Daniel W. Smith, St. Louis, Mo., assignor, by direct and mesne assignments, of two thirds to Alfred Bevis and Charles H. Longstreth, same place; filed Sept. 10, 1894. This is a trolley wire hanger in which there is a transverse recess at a point about midway of its length. Grooves formed in each side of the hanger are curved or bowed downward and extend continuously from one end of the hanger to the opposite end. The side grooves are curved abruptly downward at each end and are overhung by a lug or protection.

541,020. CONDUIT ELECTRIC RAILWAY; Daniel W. Smith, St. Louis, Mo., assignor, by direct and mesne assignments, of two thirds to Alfred Bevis and Charles H. Longstreth, same place; filed Sept. 10, 1894. Claim 1. reads as follows: "In a conduit electric railway, a loop formed integral with and in the length of the conductor at the crossings of the conduit, said loop comprising the vertically bent portions and horizontally bent portions and the circular loop, all bent from the length of the conductor."

541,028. RAILWAY RAIL SWEEPER; Thomas Waite, Cramer Hill, N. J.; filed Nov. 28, 1894. A drive shaft is carried by the car and driven from the axle. A hanger is loosely mounted on the shaft and a brush is rotatively mounted in the hanger with gearing for driving the brush in the shaft. Means for raising and lowering the hanger are provided. (See Illustration).

541,031. ILLUMINATED ADVERTISING SIGN FOR CARS; James M. Allison, Indianapolis, Ind.; filed Feb. 23, 1895. A box is adjustably mounted on the hood of the car and a light and reflector are mounted on the slide in the box. At the front upper edge of the box is a spring roller and secured to it is a screen bearing two signs. The screen passes down the roller at the lower corner to the rear under the slide and around a second roller and thence up over a third roller. A cord for operating the screen to bring one or the other of the signs in front of the light is provided.



NO. 541,028.—RAIL SWEEPER.

541,044. TROLLEY WHEEL AND YOKE; William H. Fritz, Dayton, Ohio, assignor of two thirds to Orlando P. McCabe and George R. Decker, same place; filed March 12, 1895. The trolley yoke consists of a single piece and has journal openings extending through approximately one half of each side from the centre to the circumference. On the outer side of the yoke are bosses which partially surround the journal openings. Openings in the bosses are adapted to receive pins. The shaft for the trolley wheel has openings in its ends and is adapted to be mounted in the journal openings in the yoke in which means for securing the shaft are provided.

541,045. RAIL BRAKE; James T. Hall, San Francisco, Cal.; filed Aug. 24, 1894. Supplemental frames are located between the wheels and comprise a plurality of yoke shaped bars extending, respectively, above and below the truck frame. Cross-bars are carried by the truck frame and support the supplemental frame. The brake mechanism is independent of the truck frame and there are lateral connections between the side bars of the front frame and the supplemental frame.

Street Railway Gazette.

Vol. XII. NEW YORK, JUNE 29, 1895. No. 26.

Dauphin Street Power Station of the Philadelphia Traction Company.

The Dauphin Street power plant of the Philadelphia Traction Company, while one of the smallest of the four stations owned by that company, is a model plant in respect to equipment and economy of operation.

The power house, Fig. 2, is located at Thirty-second and Dauphin streets in close proximity to the Dauphin Street entrance to Fairmount Park. The building is an extremely handsome structure of cream-colored brick, with stone trimmings, and measures 130 by 115 feet. The interior walls are also of cream-colored brick, with a handsome wainscoting extending five feet above the floor. The ceiling is of Georgia pine, closely matching the color of the walls and giving the interior a very bright and attractive appearance. The engine room contains three cross-compound non-condensing Corliss engines of the Robert Wetherell type of 750-hp each rated capacity, but have developed power greatly in excess of that amount. The cylinder dimensions are 28 and 46 inches, with 48-inch stroke, and the engine speed is 82 revolutions per minute. The fly wheels are 18 feet in diameter and weigh 40 tons each. Each engine is directly connected to a Westinghouse multipolar generator. These generators, while rated at 1,125 amperes capacity, have frequently carried 1,800 amperes.

The station is equipped with a very complete system for lubricating the cylinders and bearings. In the basement beneath the engine room are two oil tanks, one for cylinder oil and the other for crank pin oil, each tank having a capacity of 15 barrels. From these tanks the oil is pumped to a tank of eight barrels capacity, located above the engine room, from which the oil flows by gravity to the cylinders and bearings. The drip passes through a filter in the basement and is then pumped back to the gravity tank.

The switchboard, Fig. 3, is located in the north end of the room about 14 feet from the north wall and is of particularly attractive design. It is of the single deck type, with slate panels, and is 30 feet long and about 10 feet in height. The board is equipped with Westinghouse station and feeder switches and circuit breakers, Weston ammeters and voltmeters and Wurts lightning arresters. In the space between the north wall of the room and the switchboard are the roomy and well-lighted offices of the superintendent of the station.

The equipment includes a 20-ton traveling crane built by William Sellers & Company, of Philadelphia. The crane is operated by an electric motor which is controlled from the switchboard.

It is probable that the company will shortly install a complete system of Westinghouse air pumps for the generators. The engine room is lighted by large windows on three sides and at night by groups of incandescent lamps arranged on neat wooden columns and surmounted by porcelain shades.

The feeder cables range in size from 300,000 to 1,000,000 circular mils and pass from the switchboard through the cable vault and testing room which is located in the north

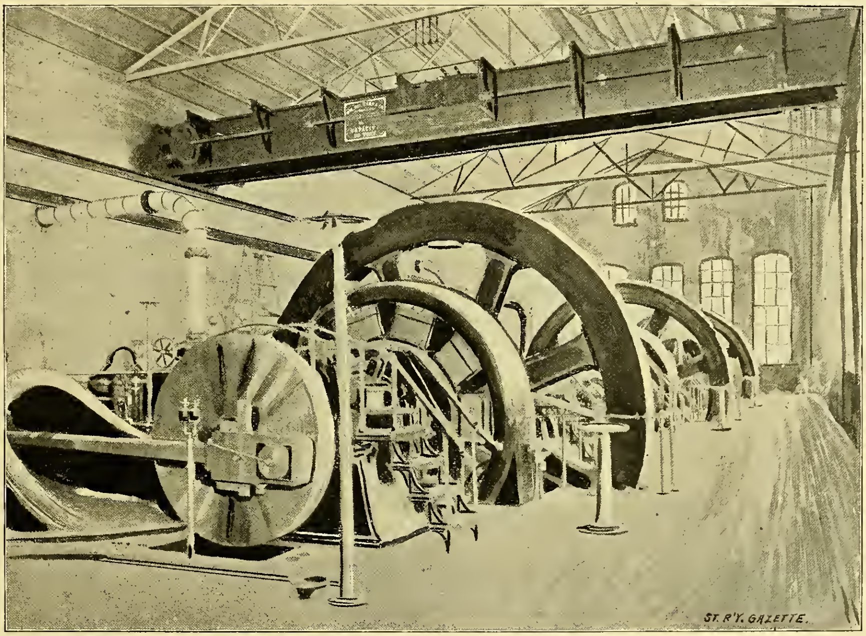


FIG. 1.—VIEW OF GENERATOR AND ENGINE ROOM.

end of the basement of the building directly under the switchboard.

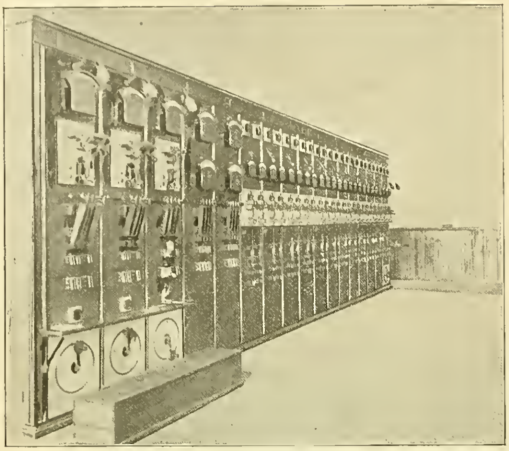


FIG. 3.—SWITCHBOARD.

The boiler room, Fig. 4, is located in the east side of the building and the floor is about ten feet below that of the engine room and level with the street.

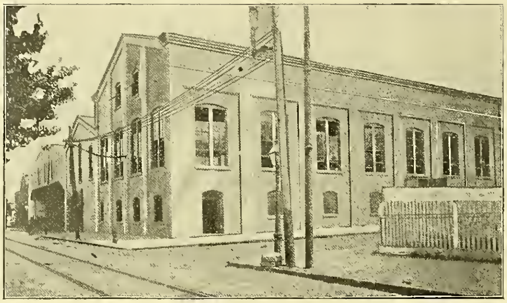


FIG. 2.—EXTERIOR OF POWER STATION.

The boiler equipment consists of eight Berry upright boilers manufactured by Robert Wetherell & Company, of Chester, Pa. Four boilers are located on each side of the stack. The boilers consist of two vertical cylindrical shells one within the other, united at the top by a crowned ring and at the bottom by a cone-shaped ring or crown sheet. The tubes are of small diameter and radiate from the inner to the outer shell in every direction forming braces for each. They are placed in vertical rows in the inside sheet and are alternately ''staggered'' in the outside sheet insuring rapid circulation of the steam and water upward near the inner shell and the downward movement of the cooler water near the outer shell. The boilers are provided with a simple and effective cleaning device consisting of an outer casing or smoke jacket designed to revolve around the boiler, and provided with a pipe having a series of blast nozzles arranged to register successively with each row of tubes through which a blast may be sent to clean them of soot.

Circulating tubes are arranged just over the tubes through which the feed-water passes before entering the boiler. Super-heating steam coils are also arranged in the top of the boiler. The boilers have been in constant service since the starting of the plant and have given excellent satisfaction.

Bituminous coal is used for fuel and the feed-water is taken from the city mains. To provide against accident to the city water mains, two storage tanks, each measuring 10 by 10 by 40 feet, have been provided. Wetherell feed-water heaters and Worthington duplex pumps are employed. In addition to the pumps there are two Monitor injectors. The stack is of cream-colored brick similar to that employed in the building and is 100 feet high. Natural draft is used, and as in two of the larger stations, mechanical draft is employed, it is the company's intention, in the present station, to thoroughly test the natural draft so that the two methods may be compared in actual service.

The lines operated by this plant are the Manayunk, a portion of the Ridge Avenue line and the Dauphin Street line to Thirteenth Street.

Seattle Power Station Burned.

The power station of the Consolidated Street Railway Company, of Seattle, Wash., was destroyed by fire last week. The station, which was a brick structure, contained, beside the generating plant, about 25 cars which were ruined. The loss was very heavy.

Street Railway Cashier Murdered in Chicago.

C. B. Birch, one of the receivers at the car house of the West Chicago Street Railway Company, at Milwaukee and Armitage Avenues, was murdered last Sunday afternoon, by an unknown thief. The cash drawer was robbed of from $100 to $200. Birch was alone in his office when the robber entered. There were men in the barn, but no one was within calling distance. The cashier was in a wire cage, but had left the door open. When the robber demanded money Mr. Birch reached for his revolver and was immediately shot. He fell to the floor, but managed to fire one shot, which went wild. The burglar fired three more bullets into his body and then, emptying the cash drawer, ran out and escaped. The safe in the office contained $5,000 in currency and the door was open, but this money was not touched. Mr. Birch died at 7 o'clock. He was able to give a description of his murderer.

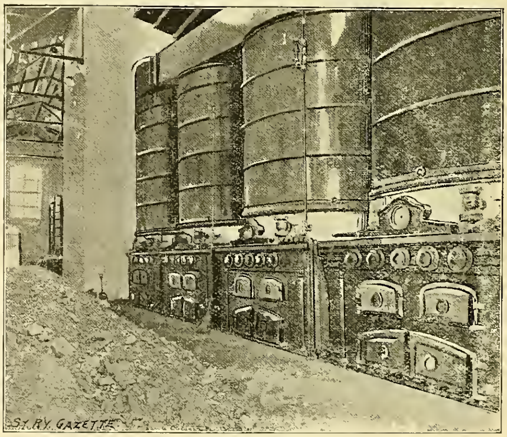


FIG. 4.—BOILER ROOM.

New Plant of the Westinghouse Electric & Manufacturing Company at East Pittsburg.—II.

POWER PLANT.

The power house is a brick structure with dimensions 206 by 76 feet. Steam is generated in Pierpoint vertical water tube boilers of an aggregate capacity of 2,500 hp. The cross-section of the power station shows the construction of the boilers. Steam is generated at 130 pounds pressure, and is delivered through wrought-iron feeders equipped with Pratt & Cady valves, to a 20-inch main which passes into a 20-inch Stratton steam separator supplied by the Goubert Manufacturing Company, of New York. This is perhaps the largest separator ever made for low-pressure steam; the pipe then drips below the floor and passes up on the other side of the fire wall to the distributing pipes supplying the engines. The mains and steam pipes are all supported by roller bearings.

POWER HOUSE.

Roney automatic stokers are used for firing, coal being fed from cylindrical iron tanks suspended, as shown in the illustration of the boiler room, from the roof trusses. The stokers are all driven by a single Westinghouse standard 5-hp engine.

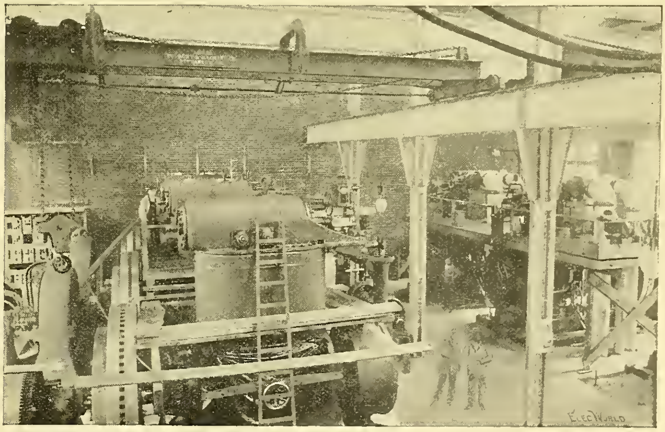
The ashes from the grate bars drop into large hoppers below the boilers and are thence delivered to cars on a track in the tunnel below the floor of the boiler house. At the end of the tunnel is an elevator for lifting the cars to the surface, where they are run to the dump, and the ashes are used for filling in. Smoke connection from the boilers to the stack is made through a 72 by 40 inch brick flue running the length of the building, back of the boilers. The smoke-pipe is of iron and was erected by Riter & Connoly, of Pittsburg. It is of the self-sustaining type, 198 feet in height, with a 10-foot core, brick-lined to the top, the whole supported on a brick base. As soon as additional boilers are installed, a second chimney will be erected.

Coal is brought to the power house by means of an elevated railway track, from which it is dropped through a chute into bins located at the east end of the power house. On its way to the bins the coal passes through a crusher if necessary. From the bins the fuel is hoisted 60 feet by means of a chain bucket elevator, which empties it into a conveyor that carries it to the tanks feeding the stokers. The capacity of each of these tanks is eight tons, and the total capacity of the bins about 150 tons. A 15-hp electric motor drives the conveyor and a 20-hp motor operates the lift and runs the crusher when required. The coal apparatus was all installed by Heyl & Patterson, of Pittsburg.

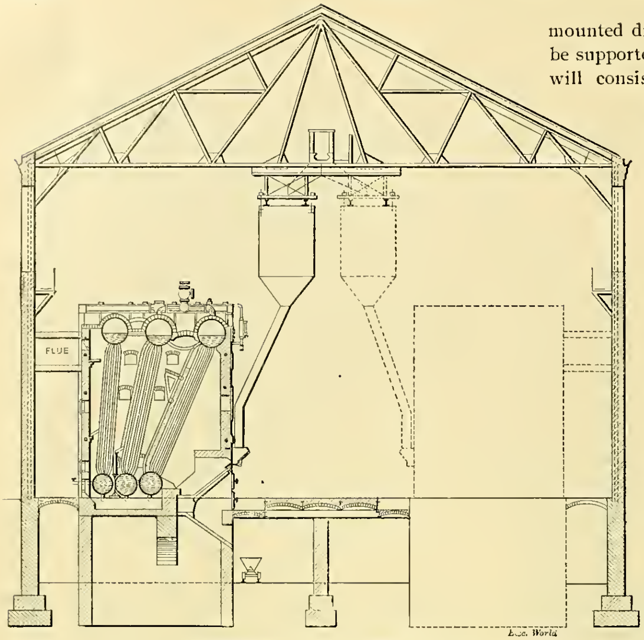
It is so arranged that feed water for the boilers may be fed under reservoir pressure directly to the boilers, or run into the feed-water heater, from which it is forced into the boilers against pressure by means of 12 by 7 by 18 inch duplex double-acting pumps, manufactured by the Wilson & Snyder Manufacturing Company, of Pittsburg. They are of the outside packed type and each of the two pumps installed is of sufficient capacity to supply all the boilers, thus insuring continuity of service under all conditions. The pumps are each fitted with a counter and there is also a water meter connected to the supply pipe so that all water furnished the boilers is accurately measured.

Part of the exhaust steam from the engine is used for supplying a Warren-Webster vacuum heater, which raises the temperature of the feed water to 200-210 degrees Fahr. Exhaust steam is also used for heating the buildings, and the condensed water from the radiators and heaters is returned to an elevated tank near the eaves of the boiler house by means of a Warren-Webster vacuum pump, which maintains from 10 to 15 inches vacuum on the heating system, thus relieving any back pressure.

The five engines already in operation are of the regulation Westinghouse compound type. The high and low-pressure cylinders are 23 and 40 inches in diameter, respectively, having a 20-inch stroke. When running at regulation speed of 215 revolutions per minute, with 125 pounds steam pressure, they develop their full rated capacity of 500 hp. The dynamo room at the west end of the building is 76 by 70 feet, and completely separated from the boiler room by an eight-inch fire wall. The equipment consists

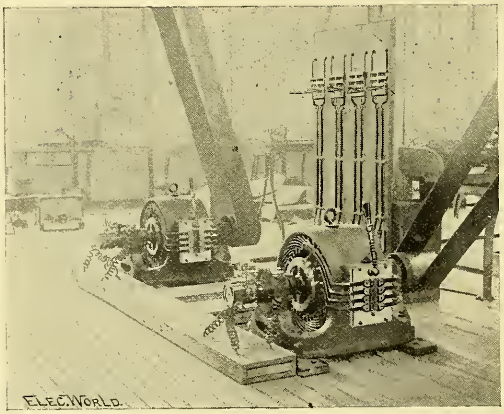


DYNAMO ROOM.



CROSS-SECTION OF POWER STATION.

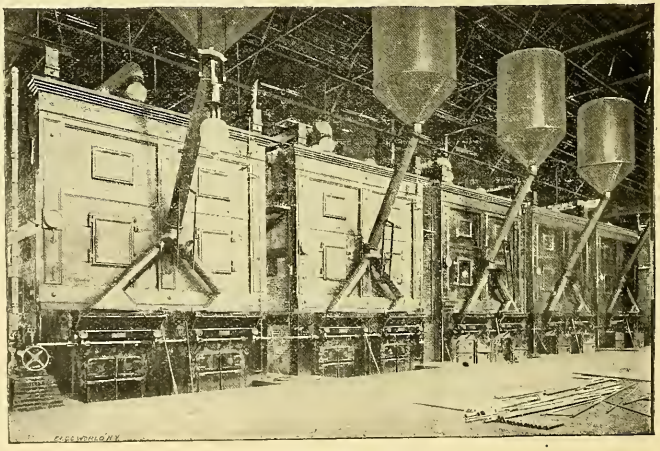
of three 500-hp two-phase generators and two 500-hp direct-current machines, each connected to a 500-hp Westinghouse compound engine. These machines are already in operation, and there is being erected an additional 500-hp direct-current generator, direct-connected to a 500-hp steeple-compound Westinghouse engine of a new type. Each of the generators rests on a bedplate in common with its engine, to which it is direct connected by means of a flexible coupling. The space occupied by the steeple engine and its dynamo is only 17 feet by 8 feet 6 inches; the other five double units occupy a space 22 feet by 8 feet 6 inches. There is also installed a revolving transformer, or two-phase motor, used for driving a direct-current arc-lighting machine, and also for supplying the exciting current for the fields of the polyphase generators. An overhead crane affords a quick and convenient method of handling apparatus to be installed or repaired. The generators are all of the Westinghouse standard type.



TWO 30-HP, TWO-PHASE MOTORS DRIVING LINES OF SHAFTING.

At present there are installed two temporary switchboards, which will be replaced by handsome Italian marble incombustible boards, one for the direct current and one for the polyphase system. These boards will be of a new and improved type, a single marble slab over 5 feet long, 2 feet wide and 1¾ inches thick, taking the place of a number of smaller units. The apparatus will be mounted directly on the face of the marbles, which will be supported by iron bracings against the wall. Each board will consist of one load, five generator and five feeder panels. The load panel will be equipped with wattmeters and voltmeters for measuring the total output of the machines in multiple. Each of the dynamo panels will contain signal lamps, main switches, voltmeter and ammeter switches, ammeters, rheostats, and synchronoscopes or phase indicators on the polyphase board for throwing in multiple. The feeder panels will be equipped with lamps, ammeters, fuses or circuit breakers, switches, etc.

In the Westinghouse plant the current is distributed through copper cables covered with simple waterproof insulation. These are carried on heavy iron brackets, with special malleable iron feed wire insulators manufactured by the Ohio Brass Company. Energy is conveyed to the carpenter shop, for example, by four 250,000 circular mils cables, transmitting polyphase currents. The punch shop is supplied with similar energy through eight 210,000 circular mils cables and the warehouse by four 500,000 circular mils cables. At the various motors four connections are made to the mains, through two double joint switches and fuses.



BOILER ROOM.

New Station of Boston West End Company.

The West End Street Railway Company, of Boston, has secured a large plot of land in Charleston, and will erect on it a new power station. The plant will have a capacity of 2,000 horse-power which will be sufficient for operating the Charleston, Malden and Everett cars. The power now used on these lines either comes from Cambridge or is purchased.

Some Practical Notes for Motormen.—V.

BY GEORGE T. HANCHETT.

It is the exception, rather than the rule, that a motorman, conductor, or even an armature winder, who is well acquainted with the method of winding a railway armature, can explain just how the flow of current in these wires, when placed in a proper magnetic field, produces a rotation. Moreover, this cannot be learned without great difficulty from the motor itself. To acquire the information, diagrams are necessary and also a knowledge of certain phenomena.

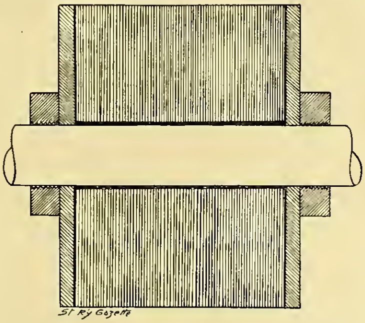


FIG. 12.

On looking over the construction of most street railway motors, it is easy to see that the armature is a cylinder or ring over-wound with copper wire, and that on the outside surface these wires are always parallel to the shaft of the motor. The armature consists of two portions, iron and copper. Let us consider the function of the iron portion first and thus dispose of it.

The iron ring or drum, usually called the core of the armature, has but two functions. First, to serve as a support on which to wind the wire, and second, to provide an easy path for the magnetic lines of force of the field magnet. The student has probably suspected, ere this, that these lines are in part responsible for the rotation, and such is the case. It is therefore desirable that as many of these lines as possible, as they issue from the north pole of the field magnet, should pass through the armature before they reach the south pole. Hence the core of the armature is made of iron, and in consequence, very few of the lines take other paths than through the armature. The observing student will notice that the iron of the armature, wherever it is visible, seems to consist of thin sheets properly shaped, and built up to form the cylinder or ring. Armatures are constructed thus for this reason. Any mass of metal revolving in a strong magnetic field will have currents generated in it. In the armature of the generating dynamo, these currents are guided down to the commutator and taken off by the brushes, but in a simple mass of metal they circle around and around in it and heat it. Heat costs power and is destructive to insulation; hence, it is always wise to avoid it in any machine whatever.

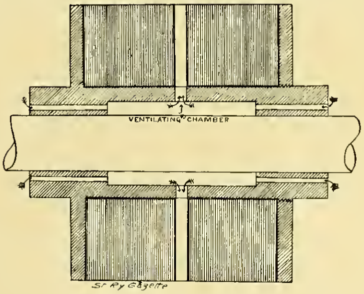


FIG. 13.

Therefore, in such masses of metal as the core of the armature of a railway motor, the iron is subdivided and insulation interposed. Then these currents which would otherwise eddy round in and wastefully heat the armature are prevented from doing so by these thin sheets of insulation placed right in the path in which they tend to circulate. Figs. 12, 13 and 14 show methods of building up armature cores used by prominent makers.

To return to the copper conductors on the armature. Only those conductors which are on the external circular surface, parallel to the shaft, are effective in driving. All the other wire is used merely to connect one of these conductors to another and to the bars of the commutator. Hence, in a good armature these auxiliary wires, if we could so call them, are as short as possible. In discussing the action of the street railway, or, indeed, any armature, the following simple experiment will prove of great assistance.

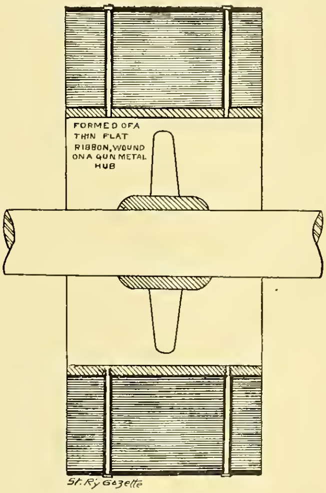


FIG. 14.

From a suitable support arrange a piece of No. 16 B. & S. wire, as shown in Fig. 15. Let the piece be smooth and straight, and free to move at its upper extremity. Allow the lower end to rest in a small dish of mercury. Fig. 16 shows a good method of arrangement. Arrange four permanent magnets as shown.

You now have pivoted at a centre of rotation a wire under the influence of magnets, precisely as the arrangement exists in a railway motor. It remains to apply an electric current to make the arrangement complete.

The current from two sal-ammoniac cells is ample. Connect one terminal to the upper support and dip the other into the dish of mercury. The wire in front of the north pole at once moves away as if repelled. Allow it to swing until it comes to rest, as it will about midway between the north pole and adjacent south pole. Then reverse terminals of the cells, or, in other words, commutate or reverse the current in the wire. Notice that the wire now swings past the south pole precisely as it did before the north pole. By commutating again, it may be made to swing past the north pole and so proceed, making four commutations to a revolution.

The action of the wire on the railway armature is no more complex. The wires on the surface of the armature revolving in front of the alternate north and south poles, carry currents in the proper direction to produce rotation. As the armature turns and the wires swing before different poles, the currents in them are promptly reversed so as to continue the rotation. However, instead of doing it by hand, as in our elementary motor, this is done automatically at the commutator by an ingenious method of connecting. We now know how the field magnets drive the armature. It only remains to be seen how the proper commutation of the wires is accomplished in practice to become able to study out any armature upon which we may chance.

As might be expected, various inventors have various ways of accomplishing the result, and as it would go beyond the limits of space to print, and patience to read, to describe them all, we will only describe a few typical methods from which the operation of others can be readily deduced.

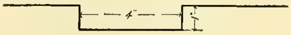


FIG. 15.

The drawings are somewhat peculiar and need a little explanation. Two views of each winding are shown and for simplicity's sake the number of conductors on the surface of the armature is much less than it would be wise to use in practice.

The first view of the winding is a view end on from the commutator. The wires on the commutator end are shown in full lines, while the wires on the rear head are shown dotted. The driving conductors on the cylindrical surface parallel to the shaft being seen end on, are shown merely as small circles on the core periphery.

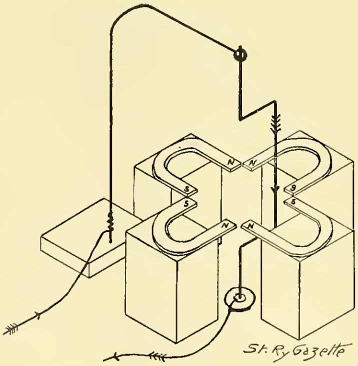


FIG. 16.

The second view is really more valuable than the first. It is the developed surface of the armature laid out flat. Imagine, if you please, that the surface of the armature, wire and all, was stripped off as the bark from a birch tree, and laid out flat for inspection.

(To be continued.)

Appointment of Receiver for Detroit Citizens' Company Asked For.

The sharp fight which has for months been in progress between the Detroit Railway Company and the Detroit Citizens' Street Railway Company has resulted in an application for the appointment of a receiver for the latter company. The suit is brought by Albert Pack, one of the leading spirits of the Detroit Railway Company. He is the owner of $25,000 worth of stock in the Citizens' Company, and by virtue of that fact he began the action. According to Tom L. Johnson, the president of the Citizens' Company, Mr. Pack's object in bringing the suit is not to protect his interests in the Citizens' Company, but to promote the interests of the Detroit Railway Company by injuring the credit of the former, or, in other words, is an incident merely in the fight between the two companies. One of the causes which, in his complaint, Mr. Pack alleges as influencing him in bringing the suit was his inability to secure information such as he wished and was entitled to have, he claims, as a stockholder. He charges Mr. Johnson with managing the company recklessly in buying track material in order to increase the profits of the Johnson Company, of which the former bought girder rails and special work.

Mr. Pack charges that Mr. Johnson and the other officers and directors are at present trying to mortgage the property rights and franchises of the company to the extent of $7,000,000, and that the whole scheme is to freeze out the stockholders, to strip their stock of all value, and deprive them of their interest and rights. If the $7,000,000 is placed, the income will not be sufficient to ever repay the principal. The bill places cost of reproducing all the lines of the company, and equipping them with electricity, at not to exceed $1,600,000, and the total assets, exclusive of the value of the privileges, at not to exceed $2,000,000. The franchises and privileges are valued in the bill at not to exceed $1,000,000. The net income, over and above operating expenses, is said to be not sufficient to pay the present indebtedness, and the policy of making such extensive improvements operates as a fraud upon the stockholders.

Mr. Johnson is charged with spending large sums of the company's money during the recent session of the legislature in employing lobbyists and influencing official actions in other directions. The officers are also charged with lavish disbursements in other ways, and bringing the company to the verge of ruin and insolvency. The books, it is alleged, are so kept as to cover up these expenditures, and prevent the stockholders from knowing them. The total interest claimed by Mr. Johnson to have been paid is $827,573.82, while the bill alleges it should not exceed $500,000. This difference, it is charged, was illegally expended. The company is alleged by the bill to be insolvent, and without assets enough to pay its debts.

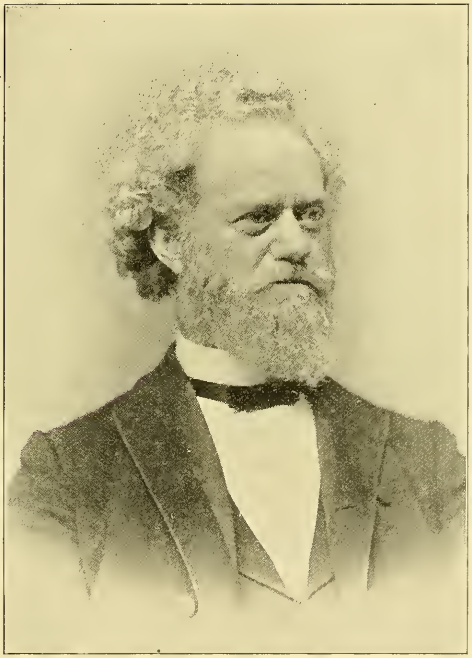
Liability for Street Paving.

A test case to determine whether the Philadelphia Traction Company could be compelled to repave certain streets through which its lines passed has been decided in favor of the company. The court held that the city could not compel the company to perform the work on these streets, because of certain provisions in charters held by the companies which controlled the roads before they were acquired by lease by the Traction Company. An appeal will be taken from the judgment. If the decision is affirmed the saving to the company will be considerable.

Street Railway Engineers.—IX.

A. S. HALLIDIE.

Those who visited the World's Columbian Exposition will remember that the most unique exhibit in the street railway department was the first cable car operated in San Francisco. The car was an insignificant one, little resembling the commodious and finely finished cars which are now drawn over the steep hills of San Francisco, but the cable system was there and all the principles which it embodies could be found in the crude car and the representation of the street construction. The exhibitor, of course, was Mr. A. S. Hallidie, the father of the cable railway. It was in 1869 that Mr. Hallidie turned his attention to the problem of drawing street cars by wire rope. Previously he had developed a system of transportation for use in mines by means of an overhead endless cable, and felt confident that with modifications the system could be applied to street railways. At the time, Mr. Hallidie says, he was unaware that any one had attempted to use an underground traveling rope for this purpose and subsequent investigation demonstrated that no one had practically undertaken it. The period of experimenting continued for four years. A good idea of the development of the system may be gained from an address by Mr. Hallidie before the Mechanics' Institute of San Francisco. ''At first,'' he says, ''we ran the cable slow (four miles an hour) to ascertain the practical effect of catching the traveling cable by the grip. Then we had numerous safety appliances which were discarded for simple and better ones, but on the whole the thing worked well, and at the first trip the correctness of my plans were apparent. The greatest difficulties were of a financial rather than of a mechanical character. The mechanical history was a slow working out of a general idea, taking up in detail and piecemeal the difficulties and objections sought for and to be overcome. Then followed the difficulties and delays of enlisting capital in a scheme which had never been tried and at which even friendly-disposed engineers shook their heads and gave wise counsel to their friends to let some others put in their money and do the experimenting.'' The money was finally raised and the work was begun at once. ''The essential requisites of a street railway on the plan I proposed were,'' Mr. Hallidie continued, ''that the car could be stopped and started on any part of the street; that the cable for hauling the car should be kept entirely below the surface; that there should be no opening in the street large enough to let a buggy tire into, and that no obstruction to the ordinary surface travel in the crowded streets of a city should exist. The grip originally designed by me was intended to obviate the necessity of making vertical or horizontal deflections in the roadbed or rails, or in any way changing or defacing the surface line of the streets. This I accomplished perfectly, by providing a horizontal and vertical motion in the grip, which permitted the tracks to be kept in a true line and flush with the normal line of the street. These grips are in operation at this day on Clay Street.''


A. S. HALLIDIE.

The first trial trip and first public exhibition took place on Aug. 1, 1873. Of the former, Mr. Hallidie says: ''The morning was foggy and gray, and, when ready to pick up the rope, the man who had been placed in charge of the grip showed such signs of fear that I was compelled to take his place, pick up the rope and take the car down the hill. On the way down, we threw off the rope and picked it up repeatedly; slacked the grip, stopped the car and ran it back, and made such experiments as opportunity offered. At the terminus at Kearny Street the car was turned around and transferred to the up track and taken up the hill without any difficulty or delay. At the top of the hill, the horse car being in waiting, the company got aboard and went to the terminus and back—thus completing the round trip.''

The public exhibition which demonstrated the practicability of the system to the citizens of San Francisco took place on the afternoon of the same day. Says Mr. Hallidie: ''In running the grip car, too many willing hands helped and swung it around with such an impetus as to break a bolt connecting the grip to the frame. This occupied about 20 minutes to repair, during which time many expressed regret that the 'thing had proved a failure'; but as soon as it was repaired the people piled into the car and on to the dummy, and hung to the guard-strip and windows outside of the car; some actually climbing on top of the car. The car, which was intended to seat 14, and the grip car without seats, held on that trip 90 passengers, all anxious to make the first trip. Everything went well until the steep pitch above Powell Street, of one in five, was encountered, when the car stopped. Feeling confident that I knew the cause of the trouble, I left the grip, and, through the kindness of Frank Edwards, an old member of the Institute, who drove me up the steep hill in his wagon.

''I soon reached the engine house and found that the grip pulley, through which power was transmitted from the engine to the rope, was slipping under the rope, which had been freshly covered with tar and which acted as a good lubricator. Some lime and sawdust were fortunately near at hand, and throwing these on the rope and with a few willing hands pulling down on the slack part of the rope, the car and its load were safely hauled to the top of the hill.'' San Francisco took kindly to the cable system and within the next year 50 miles of cable railway were constructed.

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ELECTRICITY ON STEAM ROADS.

The substitution of electric motors for locomotives on steam lines seems to be proving eminently satisfactory thus far. The reports of the test on the Nantasket Beach electric line of the New York, New Haven & Hartford Railway, while not yet very complete, seem to justify the enthusiasm of those engaged in the installation. The recent test on the Mt. Holly branch of the Pennsylvania Railway was fully as satisfactory. In both cases high speeds reaching over 35 miles an hour have been attained and the economy in operation, it is said, leaves little to be desired. Both roads are likely to demonstrate some of the possibilities of the overhead system as well as the value of good construction, for no expense has been spared to make the installations as perfect as possible.

FRAUDULENT ACCIDENT CASES.

We desire to call special attention to a brief article on another page detailing the last stage in the interesting bogus accident case in Indianapolis. When the rogues found that conviction was certain, as the case had been carefully worked up and the authorities were in possession of damaging facts relating to their previous careers, they wisely decided to throw themselves on the mercy of the court, and on their pleas of guilty they were sentenced to two years' imprisonment in the penitentiary. This is an extremely satisfactory termination of the case, and we trust it will prove a powerful deterrent to those who are trying to loot the treasuries of street railway companies by prosecuting fraudulent accident cases. At the same time we hope that the policy followed by the Indianapolis company will not fail to have its effect on street railway companies generally. Investigation has shown that the number of persons who make their living by swindling transportation companies by bogus accident claims is by no means insignificant. The principals in the Indianapolis case belong to this class, and for some time they had been systematically pressing their claims with some degree of success. It seems to be the case that companies too often fail properly to investigate suspicious accident claimants. If they cease their importunate demands the claim department is too likely to be satisfied. Seldom are vigorous measures adopted even when there is a moral certainty that the accident claimant is a swindler. This is wrong. If the example of the Indianapolis company is followed and the swindlers are brought to book occasionally, this sort of swindle, which has heretofore been engaged in almost with impunity, will likely become far less attractive, to the great advantage of the street railway industry.

PHILADELPHIA FENDER ORDINANCE.

According to the provisions of an ordinance recently adopted in Philadelphia, all the electric cars in operation in that city were to be equipped with fenders by Tuesday of this week. The companies made every effort to comply with the regulation, but found the time too short in which to complete the undertaking, and the report of the Director of Public Safety shows that 500 cars without proper fenders were counted on the streets on Wednesday last. It is probable that no penalties will be visited on the companies for their failure to provide life guards, for the reason that they have shown a readiness to obey the law and were only prevented from complying strictly with its provisions because it was physically impossible to finish the work within the prescribed time. After the ordinance had been passed, experiments were undertaken to determine the types of life-guards best adapted for use. The companies were by no means satisfied with the results when it became imperatively necessary that work should commence on the equipment of the cars. The selection of the types of fenders to be adopted was left to the several companies, and the result has been that a large variety is in use on the cars of the city; an assortment probably greater than that to be found in regular service in any other city in the country. The companies are now likely to obtain reliable information on the fender problem which will be of value to street railway companies generally, but it will be gained at a very considerable cost in all probability, as several of the types now in service will doubtless be discarded eventually.

CONDUIT ELECTRIC RAILWAYS.

Reasonable or unreasonable, there is certainly a very pronounced prejudice against overhead wires, and in certain localities in a number of cities they never will be permitted, even though their use would mean a vast improvement in transportation service. Every effort has been made to produce an electric railway system to which this objection would not apply, and storage battery systems and conduit roads have been the result. Inventions of the latter class seem to be infinite in variety. During the last six or eight years, half of the electrical patents have been granted for railways using subterranean conductors. During the month of June, the Patent Record of the Street Railway Gazette shows that 11 patents were granted to the inventors of conduit systems; some of them, doubtless, covering points of considerable merit. The public is, beyond a doubt, greatly interested in projects of this kind, because their adoption in any case means the disappearance of overhead wires. An instance showing the interest that has been taken in one installation of this kind can be cited from our own experience. The only drawing of the contact device which was originally used on the Lenox Avenue conduit road, was made in the office of the Street Railway Gazette. Since that time the illustration, reproduced from our columns, has appeared in scores, perhaps hundreds, of periodicals The device has been modified since it was first used, but so far as the papers of the country are concerned, the contact device remains the same. The demand for an effective conduit system as reliable and simple as the overhead trolley has become sufficiently audible, so that the great electrical companies find no difficulty in hearing it. A system produced by one of these companies was illustrated and described in our columns last week, and an illustrated description of a road thoroughly equipped and installed by the other great electrical corporation appears elsewhere in this issue. This road is, of course, the Lenox Avenue line of the Metropolitan Traction Company of New York City. The owners have learned thoroughly the value of good work by their experience with cable railways, and the electrical conduit construction is no whit inferior to that of the best cable railways in New York City. In fact, the construction is such that it will be converted into a cable railway should the electric system prove unsuccessful. But no one who knows the care taken in the installation, or who has noted the fine engineering talent that has solved the problems that have been encountered, can predict aught else but ultimate success for the undertaking. If this is the result the Lenox Avenue line will be merely the first of a considerable number of conduit railways in all the great cities. Those who are expecting to secure franchises for the installation of overhead systems in central city districts would display wisdom by obtaining them at the earliest possible moment. Within a few weeks the Washington conduit road will be in working order, and its success will strengthen the belief that the conduit railway problem has been solved. Thereafter, franchises for overhead wires will be much more difficult to obtain than they are at present.

End of the Indianapolis Fraudulent Accident Case.

Barney Ginsberg and Joseph Stein have pleaded guilty to indictments charging them with attempting to defraud the Citizens' Street Railway Company, of Indianapolis, by a fraudulent accident claim, and have been sentenced to two years' imprisonment each in the penitentiary. The accomplice of the two swindlers, Mrs. Yetta Bachak, was allowed to go free practically upon her own recognizance, as it appeared that she was a mere tool in the hands of the two men and as she had made it possible to secure a complete case against the principals. The attempt to swindle the company for which the two men are to be punished was described somewhat in detail in the Street Railway Gazette of May 18, and the portraits of Ginsberg and Stein appeared in the issue of June 1. The trio boarded a Pennsylvania Avenue car in Indianapolis, on April 25, and rode to Talbott Avenue. There they alighted. The woman, in getting off, fell to the pavement, and claimed to be seriously injured. A demand for $2,500 was made on the street car company, but the officials suspected crooked work, and investigated. Ginsberg claimed to be the woman's husband, but the statement was found to be false. Stein appeared as a disinterested witness of the accident and substantiated all of Ginsberg's assertions. The investigation disclosed their intimate acquaintance. May 11, when Ginsberg and Stein called at the company's office, they were arrested. The woman was subsequently arrested, and, after a day or two, fully confessed the scheme.

Sale of the Gallipolis Railway.

The Gallipolis Railway has been sold at special master commissioner's sale to General John L. Vance, of Gallipolis, O. The road will be entirely reconstructed by the new management and will require new apparatus throughout.

Resignation of Daniel F. Lewis in Brooklyn.

Daniel F. Lewis has resigned the presidency of the Brooklyn Heights Railway Company, and Clinton L. Rossiter has been selected as his successor. Colonel Timothy Williams, formerly private secretary of ex-Governor Flower, has been elected secretary and treasurer of the same company to fill the vacancy caused by the resignation of W. A. H. Bogardus. The retirement of Mr. Lewis was due to the fact that those concerned in the reorganization of the Long Island Traction Company, which controls the Brooklyn Heights interests, favor, for a variety of reasons, a change in management principally because they think changes may dispose the public to look with greater favor on the property. For this reason they prefer to see at the head of affairs a man who is not identified with the strike of last winter, as is Mr. Lewis. Mr. Lewis has made a vigorous, enterprising and untiring executive, though the recognition of his work has been unsatisfactory. Of his work the financial authority of the Brooklyn *Eagle* says:

"From out of the material which he had at hand he made a railway system which was so profitable and so rapid in its growth that the attention of New York capitalists was attracted to it. They secured control, changed the financial conditions surrounding the company, made it more complex than almost any railway system in the country, and when they had succeeded in muddling things so that there seemed to be no possibility of seeing to the bottom, when every financial detail was so tangled that there seemed to be no chance of the snarl being ever untangled, Mr. Lewis was left with practically the whole burden to bear. Under the strain he broke down physically and for many weeks was unable to consider even the slightest detail of the operating of the railway. When able to return he had a vast amount of accumulated work to attend to, beside keeping up with the duties of the day. He has been faithful and untiring in his efforts for the good of the railway company. The circumstances against which he was forced to contend, however, have been too much for any man, and being the official head of the system, the blame for what has gone wrong has been placed upon his shoulders, though due in the main to circumstances far beyond his control."

Mr. Rossiter, Mr. Lewis's successor, has been the superintendent of the Buffalo division of the New York Central Railway.

Some of the features of the plan of reorganization of the Long Island Traction Company have been made public. The plan provides for the formation of a new company, to be known as the Brooklyn Rapid Transit Company, which is to assume the lease and all assets and liabilities of the Long Island Traction Company. The $20,000,000 capital stock of this company will be exchanged for Long Island Traction stock under certain conditions. An issue of $7,000,000 bonds is to be made to run ten years and to carry 6 per cent. interest. An assessment of 10 per cent. will be made upon the stock of the Long Island Traction Company. Those who have already contributed the $2 per share called for by the reorganization committee in March will have to pay an assessment of only 8 per cent. The collateral trust notes, now issued to the amount of $1,800,000, and which have been recently purchased in large amounts on behalf of the Flower syndicate, will be taken up on Aug. 6, when the one-year option will expire. An underwriting syndicate has already been formed for the purpose of insuring the success of this plan. It will guarantee to the new company the full payment of the assessment and full subscription to the stock. In return therefor it will receive certain privileges.

In Honor of H. M. Littell.

A banquet was given in New Orleans last week in honor of Mr. H. M. Littell, who recently resigned as manager of the New Orleans City & Lake Railway Company and president of the New Orleans Traction Company, to assume the presidency of the Atlantic Avenue Railway Company, of Brooklyn. The hosts of the occasion were the directors of the New Orleans City & Lake Railway Company. Several speeches were made, in which Mr. Littell's extraordinary success in building the electric street railway system of New Orleans was referred to in flattering terms. Mr. Littell was presented, during the course of the evening, with a beautiful silver service.

Comment and Views of Contemporaries.

Electricity on the Manhattan.—Electricity as a common factor in the uses of metropolitan transportation, is at the door. It must be admitted and will not be denied. These denials of the gentlemen who speak for the Manhattan Elevated Company may be correct as to forms, terms, dates or details. They do not assume to deny, they, in fact, admit that the matter of the substitution of electricity for steam has been for a considerable period of time under consideration.—*New York Evening Telegram.*

Rapid Transit Demand.—Complaint is made that our streets and other public highways are so largely given up to these agents of rapid transit, and it is possible that in some instances concessions have been made which ignore the rights of the people. We take it, however, that the time is not far removed when there will be radical changes in the apportionment of the streets and other highways to the various forms of travel, under which chief consideration will be had for the agents of rapid transit.—*Toledo Commercial.*

Trolley Roads Needed.—Electric roads ought to be as free to build and maintain lines as the steam roads, and the latter should have full liberty to use electricity as a motive power wherever it may be deemed convenient or economical. If the law does not give these privileges, it is only a demonstration of its weakness. There is a broadly useful field for electric lines to occupy, and the public is entitled to the benefits to be derived from its occupation. At the same time, public safety is a primary consideration, and no type of railways should be permitted to unnecessarily endanger human life or limb.—*Pittsburg Dispatch.*

Electric Elevated Roads.—The Manhattan Elevated system is a large one and the substitution of electricity for steam on it will be an event of much interest both to the world of science and the public in general. The change must be made before long, too, on the elevated roads in Brooklyn. One of the chief objections to the elevated road has been the nuisance created by the smoke and cinders and noise incident to its operation by steam. With the introduction of electricity these objections would disappear. It is possible to build elevated roads in wide streets so that they will not be unsightly and will not cause great obstruction of the light. The New York roads are not fair samples of what can be done in this direction. It will be possible to put the tracks at a greater height when the stations are reached by elevators. When it is equipped with electric motors and elevators the elevated road in the large city will not be such an objectionable institution. The choice must be between this and the underground road in the future, for rapid transit on surface roads is attended with too much danger to be long allowed in large cities.—*Buffalo Enquirer.*

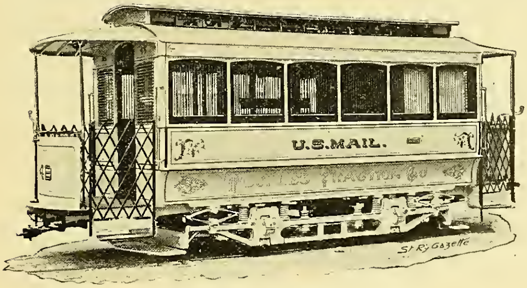
Detroit Agreement Signed.

The agreement between the Street Car Employees' Association and Detroit Citizens' Street Railway Company has been signed. The representatives of the former refused to attach their signatures to it at first, because one of the clauses provided that the conductor must punch transfer tickets in the presence of the passenger. The employees claimed that the rule could not be complied with in busy hours, as the work would occupy too much time. The company decided to waive the point.

Trolley Mail Service in Philadelphia.

Since the first of the present month two mail cars have been in use on the electric lines of the People's Traction Company of Philadelphia. The service is known in the Postoffice Department as Route No 110,257. The cars run regularly on the new route which has been established between Chestnut Hill and Snyder Avenue, receiving and distributing mail between the sub-postal stations and the central office at Ninth and Chestnut streets.

The cars are 16 feet in length and were constructed in the shops of the company. They are painted white, with gold trimmings, and on the side panel is painted ''U. S. Mail.'' They are mounted on Peckham trucks. The whole of the cars is used for the mail and the cars are drawn as trailers.



MAIL CARS USED IN PHILADELPHIA.

It was thought that the safety of the mails would be better secured by using the entire car. It was recognized also that the distribution of mail in transit could be more effectively done if the greater space is provided. The cars are heated and lighted by electricity and when the quantity of the mail requires, an electric cancelling machine may be used. They are also furnished with letter cases, distributing tables, opening tables, pouch racks and piling stalls, and the letters may be mailed on the car by the public through a letter chute at the points where the cars stop to take on and let off passengers.

No Receiver for Lake Street Elevated.

Judge Showalter, in the United States Circuit Court, in Chicago last week, refused to grant a petition for the appointment of a receiver for the Lake Street Elevated Railway Company, of Chicago, on the application of William Zeigler, a stockholder and bondholder, and formerly one of the board of directors.

Lenox Avenue Conduit Electric Railway, New York.

The first practical electrical underground conduit railway in this country is now in operation and will shortly be connected to the great cable traction system of the Metropolitan Traction Company, of New York City. The public will then be able to travel from the Battery to 146th Street, with one transfer, from the cable car to the electric car, at West 108th Street. The underground electric system employed differs radically from all other systems of electric underground conduit railways both in respect to the construction of the conduit itself and the method of taking the current from the conductors for the motors. It has been operated more or less experimentally for the last month and its success has justified the sanguine predictions of the electricians and engineers who effected the installation. In the April 13th issue of the Street Railway Gazette appeared an illustrated description of the system, but since that time many changes have been introduced.

The introduction of this system upon the surface lines of New York is the result of the determination of the Metropolitan Traction Company to give to New York a satisfactory electrical system of propulsion which would not be the subject of that peculiar popular prejudice which has acted to debar it from the advantages of the overhead trolley system. Consideration of the question resulted in the selection of a conduit system designed and manufactured by the General Electric Company, and the long stretch of road on Lenox Avenue was chosen for the experiment.

In formulating the project the Traction Company proceeded upon the most conservative lines, and determined to reduce the consequences of failure to the minimum of damage which would inevitably arise from any stoppage in the service. The plan, therefore, contemplated the construction of the line as if for a cable road, in order that, should the electrical system prove unsuccessful, the electrical portion could be abandoned and the cables and pulleys of a cable system be introduced into the conduit without loss of time and at comparatively small expense. Upon this basis construction was begun and no pains or expense have been omitted to render the installation and operation successful.

The Lenox Avenue line is a double tracked road, starting at the car house at 146th Street and running directly south to 116th Street into which it turns and proceeds as far west as Manhattan Avenue. It turns here and extends as far south as 108th Street, along which it is carried to the junction of that street and Columbus Avenue. The district which this line will serve is at present somewhat sparsely settled, but the facilities of transit which it will afford will probably result in the rapid development of a new residence section for New Yorkers both on the south as well as the north side of the Harlem.

The power house is a temporary frame structure with a sheathing of corrugated sheet iron, located on 146th Street a few yards west of Lenox Avenue. Steam is supplied from two Babcock & Wilcox water tube boilers, arranged in one battery. Each has a rated capacity of 250-hp, furnishing steam at 120 pounds. The two 650-hp engines are horizontal cross-compound Allis-Corliss machines which during the experimental trips will run non-condensing. All the steam piping is placed beneath the floor of the engine room. To each of the engines is coupled a General Electric 400-kw generator of standard construction but wound for 350 volts, instead of 500 volts. The machines are placed between the high and low pressure sides of the engines.

From the generators the cables run beneath the switchboard to a subway, under the sidewalk on 146th Street extending as far as Lenox Avenue, where they are introduced into the five-inch iron pipes running parallel with the conduit. For the present the line will be operated directly from the power house, but the feed wires will probably be placed in the pipes and will be tapped into the conductor at the necessary points. This line will then be divided up into sections and its general operation will be thereby greatly facilitated.

The construction of the underground contact system is extremely simple. The contact plow, Fig. 2, suspended from the car truck, passes through the slot in the centre of the track and presses against the flat surfaces of two iron conductors running the entire length of the conduit, Fig. 3. These conductors are placed each three inches on each side away from the centre of the slot to escape the effects of any drip which would otherwise reach them, and are of channel iron four inches deep and 30 feet long. They are suspended from the ceiling of the conduit by means of insulators devised for the purpose, and are at a depth of 13 inches below the conduit slot. Each conductor is sufficiently rigid to require suspension at the ends and centres only, and the ends being located in the manholes and hand holes being placed at the centres, inspection and repair are rendered comparatively easy. The conductors are bonded to each other by stranded copper wire securely riveted into the web of the metal.

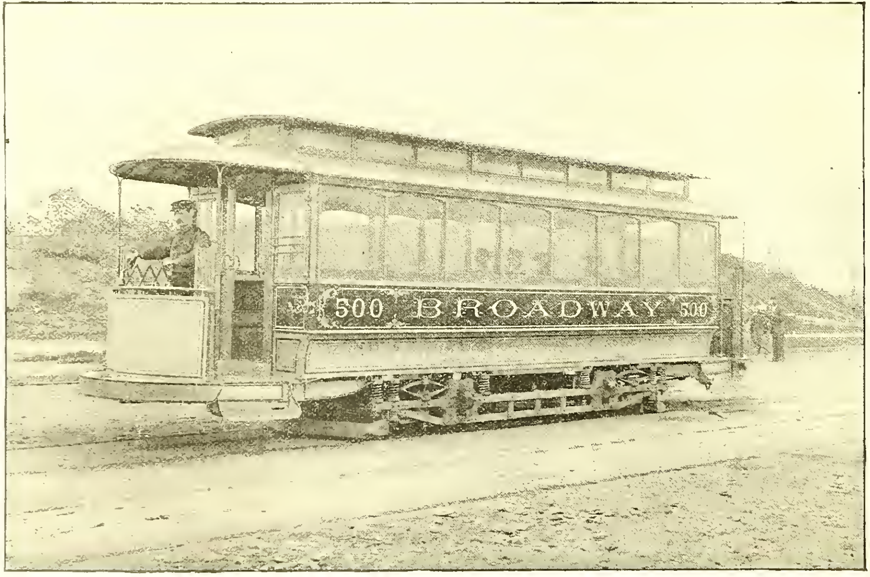


FIG. 1.—ONE OF THE CARS.

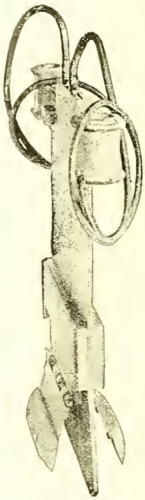


FIG. 2.
CONTACT DEVICE.

A modification of this system, Fig. 4, of suspension of the conductors is introduced for a length of about 100 yards of single track on 116th Street between Lenox and Seventh Avenues. This is known as the pedestal method of support. At the manholes the conductors are supported by soapstone pillars, instead of suspended from insulators attached to the ceiling of the conduit. The channel bar conductors in this case are five inches deep and are set 12 inches below the slot. The soapstone pillars are provided with iron caps furnished with brackets to which the conductors are bolted, and continuous connection is secured by means of a bond of flat copper strips riveted to the webs. The soapstone blocks are set in iron bases erected in the manholes.

Every twelfth manhole is connected with the power house by telephone. Quick-break switches are located at intervals in these manholes, in order that any section of the line may be cut out in case of trouble or accident. At the track switches each conductor is provided with a flaring nose to facilitate the entrance of the plow into the conductors. The manholes in which the insulators are placed are 4 feet 4 inches in depth, 4 feet in length, and 14 feet 5½ inches in width, that is, the entire distance of the two tracks. They are constructed of brick with eight-inch walls that rest on concrete foundations. The floors are laid with six inches of concrete and are provided with drains for carrying off water. With this provision for drainage no trouble from water in the conduit will, it is believed, be experienced. The conduit was built along the grade of the street but with sufficient pitch to permit any water flowing into the conduit to find its way into the manholes, located every 30 feet, and from thence into the sewers.

The current does not return by means of the rails as is usually the case with the overhead trolley. Each conductor forms one side of the working circuit, and the current is fed into the positive conductor and returns over the other or negative conductor. The current merely rises on one side of the plow, Fig. 2, passes through the controllers into the motors, and after performing its duty returns by the other side to the opposite or negative conductor.

The plow or traveling contact arrangement, Fig. 2, is essentially novel and differs materially from the device originally in use and illustrated in the Street Railway Gazette. It consists of two pieces of iron, one on each side of the plow, supported on spring leaves which causes them to press outwardly against the two conductors. The plow is suspended from a longitudinal bar bolted to cross-beams set upon the track and is constructed of two sheets of steel laid each one upon a plate of fibre. The two sheets of fibre are then brought together enclosing strip copper conductors connected at the top to the motor cables, and at the bottom riveted to two other pieces of sheet steel. These run on each side of the plow and serves as supports for the hinges which carry the sliding contact pieces. A heavy sheet of fibre continues downward and serves to separate these contacts. The motors employed are the standard General Electric 800 machines, controlled by K^2 controllers.

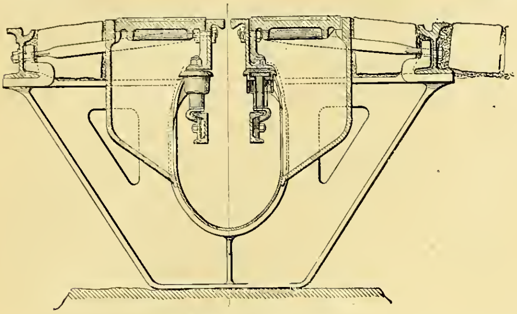


FIG. 3.—CONDUIT.

The cars which are to be used, Fig. 1, on the line were constructed by the John Stephenson Company and are mounted on standard cable trucks constructed by the Peckham Motor Truck & Wheel Company. They resemble those used on the Broadway line. The cars are to be lighted by nine incandescent lamps arranged in groups of three each. A car barn similar in construction to the power house has been built at the corner of 146th Street and Lenox Avenue. The building is provided with four tracks and has a storage capacity for about 20 cars. The tracks are provided with pits for the examination of the trolleys and motors.

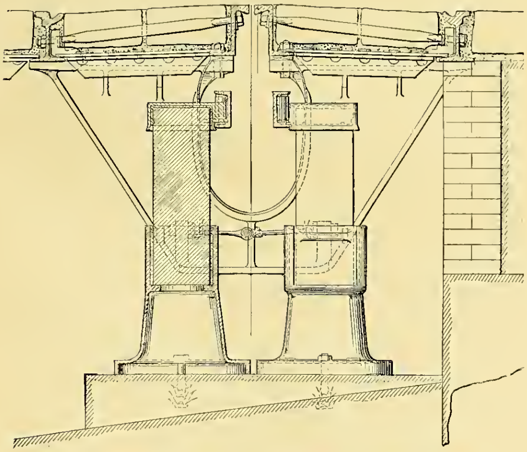
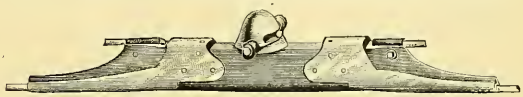


FIG. 4.—PEDESTAL METHOD OF CONDUCTOR SUPPORT.

It is stated that in case the operation of the electric conduit system proves successful the power will be increased by the addition of three direct-connected units of 1,500 hp each, making the total capacity of the station 5,000 hp. In that event the present temporary structure will be replaced by a handsome brick building for a power plant, car house and repair shops. It will be built on the west side of Lenox Avenue, on which it will extend 200 feet, and its depth will be 550 feet. It will be two stories in height, constructed of a steel skeleton enclosing brick walls and will be fireproof. The car house will have a capacity for about 350 cars. The office of the receivers and starters, as well as the waiting room for conductors and motormen, will be located at the corner of 146th Street. The car house will be provided with two large elevators, which will be operated by electricity. Ample provision has been made on the ground floor for repair shops and rooms for the engineers and firemen. The superintendent's office and a large reading room for the employees will be arranged on the second floor. In the tower on the third floor accommodations will be provided for the electricians of the station.

Medbery Section Insulator.

The Medbery section insulator was originally designed for the Chicago City Railway Company, which has over four hundred in use, the entire line being equipped with this simple but very effective device. The insulating part is made up of very heavy vulcanized fibre and the metal parts are aluminum bronze, which is used only by the Fiberite Company in all of its devices, because of its suitability on account of strength and durability for electric railway equipment. This device is very largely in use in the West, and during the past year several leading traction companies in the East have adopted it, with good results. The method of insulating the sections of the line, as well as the ease of adjustment, are notable advantages. E. S. Greeley & Co., of New York, carry a full line in stock, and shipments are made from the works at Mechanicsville, N. Y.


THE MEDBERY INSULATOR.

Right to Tax Franchises Affirmed.

The Supreme Court of Wisconsin last week handed down a decision affirming the right of cities to tax the franchises of the companies operating street railways, water and lighting plants within their limits. The court held the franchises to be personal property and subject to taxation, but under the limitation that they should be taxed only in connection with the tangible property used in their operation, and that then they could only be taxed as an entirety, and not in each ward where a portion of the plant might be situated. The case originated in Milwaukee, where the Milwaukee Street Railway Company objected to the assessment of its franchises, and those of the Badger Illuminating Company and of the Edison Electric Illuminating Company that are controlled by the street railway company. This objection was first made before the Board of Review, which refused to exempt these franchises from taxation, but equalized the taxes so that the amount assessed on the franchises was about $2,500,000. The company appealed to the Circuit Court for Dodge County, the attorneys for the company contending that the city could assess only the tangible property of the company. The lower court took the same view of the case. From this judgment the city officials appealed the case to the Supreme Court.

FINANCIAL NOTES.

TO LIMIT BOND ISSUE.—The Connecticut House last week passed the bill which provides that street railway companies shall not issue bonds in excess of 50 per cent. of the actual cost of construction and equipment.

PETITION FOR INCREASE OF STOCK.—The Lowell & Suburban Street Railway Company, of Lowell, Mass., has petitioned the Massachusetts Railway Commissioners for the right to increase its capital stock $400.000.

AUSTIN RAILWAY LEVIED UPON.—The sheriff has levied upon the entire line, rolling stock and other property of the Austin (Tex.) Rapid Transit Company, to satisfy a judgment obtained in a damage suit by Theodore Cullen.

APPOINTMENT OF A RECEIVER ASKED FOR.—The Old Colony Trust Company, Boston, has commenced a suit to foreclose a mortgage of $200,000 against the Allentown & Bethlehem (Pa.) Transit Company. The appointment of a receiver is also asked for.

RAILWAY TO BE SOLD.—Judge Arrington has made a decree ordering the foreclosure of the mortgage on the West End & Riverside Electric Street Railway of Montgomery, Ala. A suit was brought by the State Trust Company of New York, which was trustee for the bondholders.

SALE OF TIFFIN RAILWAY.—The Tiffin & Fostoria Electric Railway property has been sold to the Interurban Rapid Transit Company for $19,784. This amount is only about two thirds of the appraised value. No bids were received for the horse-car and Tiffin electric lines. The purchasers say that they will complete the railway which they have purchased within a few weeks.

HARRISBURG TRACTION COMPANY.—The directors of the Harrisburg Traction Company, which will absorb the Harrisburg street railways, has elected as president Edgar C. Felton, general manager of the Pennsylvania Steel Company, and as vice-president, B. F. Meyers, president of the Citizens' Passenger Railway Company, which is one of the companies to be absorbed.

LEASE OF THE WORCESTER NORTH END RAILWAY.—The North End Street Railway Company, of Worcester, Mass., has been leased to the Consolidated Street Railway Company, of that city, for a period of 99 years. The lease provides that the payment of a rental by the Consolidated of $7,250 for the first year, $7.750 for the second, and $8,000 for each succeeding year during the life of the lease.

LAKE STREET ELEVATED.—D. H. Louderback, president of the Lake Street Elevated Railway Company, of Chicago, was recently quoted as stating that the company is now practically out of its financial difficulties. With its bonds scaled to 60, he says the securities come nearer to representing actual cash cost than those of any elevated railway in Chicago. He predicts that it will be the first of the existing roads to be on a paying basis.

AGREEMENT IN BALTIMORE.—It is announced that the City & Suburban Railway Company, of Baltimore, has settled its differences with the Baltimore & Fredericktown Turnpike Company by an agreement to waive condemnation proceedings and pay $23 000 for a track franchise all the way from Baltimore to Ellicott City. The terms of the agreement were arranged by President Nelson Perin, of the City & Suburban, and President W. W. Taylor, of the turnpike company. It is understood that the City & Suburban will proceed at once to introduce the electric system on the Catonsville line.

BICYCLE RAILWAY.—The Kings, Queens & Suffolk Railway Company will probably soon be incorporated. This will be the actual operating company for the bicycle railway. The Kings, Queens & Suffolk company, which is in existence and which is engaged at present in securing the right of way and in the preliminary work for the building of the railway is the construction company. The new company will have a large board of directors made up of well-known Brooklyn people and Long Islanders. The time when the work is to be started is not yet set, but President Frederick Dunton says it is now only a question of a short time. A new idea is to be introduced in the bonds of the railway company. The coupons on them are to be made good for a certain number of rides on the railway or good for a certain amount of freight, so that in case there should be any default the holders of them could secure their money's worth until the operation of the railway ceased.

NEW INCORPORATIONS.

THE ERIE REED PARK & LAKESIDE STREET RAILWAY COMPANY, of Erie, Pa., has been incorporated. Those interested are Chas. M. Reed, F. G. Curtze and Harry L. Moore. The capital stock is $50,000.

THE ERIE & EASTERN STREET RAILWAY COMPANY, Erie, Pa., capital stock $25.000, has been incorporated by Harry L. Moore, F. F. Curtze and C. M. Conrad, of Erie, Pa., to build an electric railway in that city.

THE NORTH TRUMBULL RAPID TRANSIT COMPANY, Warren, O., has been incorporated for the purpose of constructing a passenger and freight electric railway from Farmdale to Mesopotamia, a distance of 20 miles.

THE BUFFALO, GARDENVILLE & EBENEZER RAILWAY, Gardenville, N. Y., has been incorporated by Charles Schoepflin, Gardenville, Jacob Kissinger, C. H. Lamy and E. C. Shafer, of Buffalo, N. Y. The capital stock is reported as $40,000.

THE UTICA & HERKIMER STREET RAILWAY COMPANY, Utica, N.Y., capital stock $30.000, has been formed to build and operate an electric railway three miles long. Those interested are D. S. Foster, G. E. Dennison, and B. A. Rogers, of Utica, N. Y.

NEWS OF THE WEEK.

TROY, N. Y.—Work has been commenced on the electric railway between Troy and Sand Lake.

WOBURN, MASS.—The car house of the East Middlesex Street Railway has been burned, the loss being about $35,000.

CHICAGO, ILL.—The first regular train on the west branch of the Metropolitan Elevated Railway was started last week.

GREENWICH, N. Y.—Reeves Smith, of Troy, is making a survey for an electric railway between Greenwich and Schuylerville.

PORT HURON, MICH.—The contract for constructing the Port Huron & Lexington Railway has been given to Joseph A. Thick.

DETROIT, MICH.—The Citizens' Street Railway Company has ordered of the John Stephenson Company, of New York, 100 closed vestibule cars.

CORTLAND, N. Y.—The Cortland & Homer Traction Company has been granted a franchise for the use of Elm, Railroad, Franklin and River streets.

ST. JOSEPH, MO.—An ordinance granting a franchise for an electric railway to W. A. Kellond and W. T. Van Brunt has been introduced in the City Council.

DALLAS, TEXAS—The Dallas Rapid Transit & Terminal Company has been organized by B. S. Watham, A. F. Hardie and others, to build an electric road in said city.

ERIE, PA.—It is reported that a company has been formed to build an electric street railway from Erie to North East. Frank L. McLaughlin, of North East, is interested.

MILFORD, VA.—It is reported that a company will be organized to build an electric road from Milford to Bowling Green, in Carolina County, a distance of about six miles.

HOBOKEN, N. J.—A petition for a franchise to the Jersey City, Rutherford & Hoboken Railway Company has been made to Council Chairman Timken of the City Council.

SYRACUSE, N. Y.—All the towns on the route of the South Bay Electric Railway Company have granted franchises and work may be commenced before the close of the summer.

BOSTON, MASS.—The residents of Dorchester have presented a petition to the West End Street Railway Company, asking that the lines of the company be extended through several streets in that district.

MASON CITY, IA.—The Mason City Electric Light Company expects to build an electric line connecting the depots of the city. J. B Rowland and R. H. Ames are interested in the proposed electric line to Elm Grove.

ST. LOUIS, MO.—E. J. Thurman, W. D. Waters, and J. B. Clayton, of Fenton, Mo., have been granted a charter to construct and operate a double track electric railway from St. Louis to Morse Mill, a distance of 35 miles

ALTON, ILL.—J. F. Porter, of the Alton Street Railway Company, has purchased the old lines of street railway in Alton, and after improving the equipment, will operate the combined systems under one management.

PITTSBURG, PA.—Mayor McKenna has signed the ordinance granting permission to the Central Traction Company to extend its line to the East End, by the way of Aliquippa and Belwood streets and Centre and Begley avenues.

OSHKOSH, WIS.—The Oshkosh Real Estate Board has adopted resolutions denouncing the Oshkosh Street Car Company for laying tracks at midnight and for litigation instituted to harass the projectors of the Tillotston electric line.

LONG BRANCH, N. J.—Application has been made to the Township Committee of the township of Ocean, Monmouth County, by the Atlantic Coast Electric Railway Company for the construction and operation of a street railway.

CHAUTAUQUA, N. Y.—Among those interested in the project to construct an electric road from Chautauqua to Mayville are the following residents of Mayville: Postmaster Byrnes, W. F. Fisher, Judge Van Duzen and George W. Hewes.

CICERO, N. Y.—The Syracuse & Oneida Lake Electric Railway Company has made application for consent to construct, maintain and operate by animal power or electricity, a street surface railway, with necessary sidings, etc., along certain streets in this town.

STEVENS POINT, WIS.—The Stevens Point Electric Lighting Company has been given another year in which to begin the construction of an electric street railway under its franchise. By Sept. 10, 1896, it must have at least three miles of road completed, or forfeit $2,000.

CHICAGO, ILL.—The Calumet Electric Street Railway Company has petitioned for an injunction restraining the city from interfering with the construction of its road at 119th Street from Emerald Avenue to Halsted Street and south on Halsted Street to 121st Street.

ST. LOUIS, MO.—The Board of Public Improvements has approved the Yost fender, submitted by the Lindell Railway Company, and the Providence fender, submitted by the Union Depot Railway Company. All the cars of those two companies will be equipped with these fenders

CHICAGO, ILL.—John F. Waters has been indicted by the grand jury on the charge that he engaged in a conspiracy to defraud the West Chicago Street Railway Company. The charges are said to be based upon alleged perjured testimony in connection with personal damage suits.

NEW BEDFORD, MASS.—When one of the cars of the Dartmouth & Westport Street Railway Company was descending the grade at Smith's Mills, one of the forward wheels broke, and the car left the track and toppled over. Nineteen passengers were injured, some of them quite severely.

BROCKTON, MASS.—The directors of the Brockton & North Easton Street Railway Company will petition the city of Brockton and the town of Easton for permission to introduce an electric railway. W. F. Pope, of Boston, has been elected secretary and treasurer of the company.

BEAVER FALLS, PA.—A company is being organized to build an incline railway to Paterson Heights a suburb of Beaver Falls. H. M. Meyers, John Reeves and other local capitalists are the principal movers in the enterprise. It will be 1,500 feet in length and operated by electricity.

BEVERLY, MASS.—W. B. Ferguson, Charles A. Richardson, N. E. Martin, A.B. Bruce, N. Sumner Myrick and Frank J. Perkins have petitioned to the Board of Aldermen for location of tracks with the necessary turnouts for the Gloucester, Essex & Beverly Street Railway Company.

MILWAUKEE, WIS.—A company is to be formed to build and operate the proposed Cudahy Street railway line. H. M. Green is interested. It has not yet been determined whether an independent line will be constructed or an extension made to the Russell Avenue division of the Milwaukee City line.

ST. LOUIS, MO.—J. P. Case, president of the St. Louis & Meramec River Electric Railway, which will connect St Louis with Kirkwood, Meramec Highlands and other suburban towns, announces that work on the roadbed will begin at once, and that the road will be ready for operation next spring.

ST. JOSEPH, MO.—The first step in the building of an electric line to St. George has been taken by the St Joseph Traction & Lighting Company. The company agrees to commence work within 90 days after the passage of the ordinance and have the road completed within six months thereafter.

WILMINGTON, DEL.—General A. T. Cooper, secretary of the Wilmington & Chester Electric Railway Company, states that the company has received great encouragement, and has been led to believe that it can obtain the desired right of way with little difficulty. He is sanguine that the enterprise will be successful.

CHICAGO, ILL.—Arguments were heard last week in the suit of the Chicago General Street Railway Company against the Chicago City Street Railway Company. The action was brought to recover damages alleged to have been caused by the defendant when the plaintiff attempted to operate one of its cars over the Chicago City track.

AUBURN, N Y.—The General Term has confirmed the report of the commissioners appointed to determine whether a street railway extension should be built through West Genesee Street. An ordinance giving the Auburn City Railway Company the privilege of constructing this extension has been passed by the City Council, and has been accepted.

BROOKLYN, N. Y.—James A. Mason has been held for the grand jury on the charge of swearing to a false affidavit. When employed by the Brooklyn Heights Railway Company he swore to the statement that he had never worked on a street railway before It was afterward learned he had been employed on the Brooklyn, Queens County & Suburban Railway.

READING, MASS.— Col. C. F. Woodward, president of the Wakefield & Stoneham Street Railway Company, is said to be interested in the project of building an electric road from Reading to Lowell. Among those interested in the electric railway to be built between Stockton and Lodi are Congressman James A. Louttit and Harry C. Bunn, of Chicago

WASHINGTON, D. C.—The District Commissioners have notified the Eckington & Soldiers' Home Railway Company that the retention of the overhead trolley system after July 1 will be in violation of the law. The company is asked to operate the New York Avenue branch by a system other than the overhead trolley, and to remove before that time the overhead wires and poles.

HAMMOND, IND.—The City Council has granted a franchise to the Hammond & Blue Island Railway Company to build an electric railway from a point where the city limits of Chicago meet Hammond to the lake front on the north of Lake Michigan. Among those who are interested in the company are J. P. Lyman and J. A. Ostrom. It is announced that work on the line will begin at once

ROCKVILLE, CONN.—The Stafford & Rockville Electric Railway has commenced the survey on its railway which will be twelve miles in length. It is announced that the line will be constructed this summer. Those interested in the company are residents of Massachusetts and Willard F. Ferguson, of Malden, is president. The line will be a link in the electric railway system from Worcester to Hartford.

BUFFALO, N. Y.—It is proposed to have the road from Buffalo to Gardenville and Ebenezer in operation by Sept. 1 The line will be about four miles in length. Among those interested in the project are Assemblyman Schoepflin Dr. E. H. Ballon, Michael Austeth, George Urban, Jr., H. C. Lein, Jacob Doetsch, E. G. S. Miller, George H. Lamy, Tracy Becker, Bishop Ryan, James A. Roberts, Joseph E. Gavin, Alderman Kissinger, E. C. Shafer and Henry W Brendel.

ST LOUIS, MO.—The Board of Public Improvements last week visited the power station of the St. Louis & Suburban Railway to witness tests of several fenders. There were five competitors The Brown, Crawford the Cincinnati, Providence and Mitchell fenders The tests necessitated the picking up of dummies, and the result was not considered entirely satisfactory. The best record was that of one of the fenders which picked up a dummy three out of five times.

CHESTER, PA.—Work has been commenced on the electric railway which will extend from Morton, on the Delaware County & Philadelphia Electric Railway, to the Lazaretto, by way of Prospect Park, where connection will be made with the Chester Traction Company's Darby branch The new road will tap a thickly settled country, and will afford a convenient means of reaching Chester from the eastern section of the county. Power will be furnished from the Chester Traction Company's power house in Chester.

BOSTON, MASS.—The State Arbitration Board last Monday heard the grievances of representatives of the car barn employees of the West End Street Railway Company. The company has decided to ignore the application for the interference of the Arbitration Board. The requests of the men are that there be a reform in the number of hours of labor, an opportunity to attend church services on Sunday, free badges to ride on cars, preference for pit work, and work on the cars, and an increase of wages from $1.50 to $2 per day.

WASHINGTON, D. C.—The construction of the electric road between Washington and Laurel, Md., will commence at once. The Washington & Baltimore Tramway Company, familiarly known as the Boulevard Company, has secured a controlling interest in the stock of the Columbia & Washington Electric Railway Company, and will build an electric railway, minus the boulevard, under the power contained in the charter of the Columbia Railway Company. The boulevard is, therefore, a thing of the past. The construction of this electric railway has been placed in the hands of a construction committee with directions to proceed at once.

HARRISBURG, PA.—Decrees of ouster have been filed by Judge Simonton against the following Philadelphia street railway corporations: Aramingo Avenue Passenger Railway Company, West Girard Avenue Passenger Railway Company, Cambria & Somerset Streets Passenger Railway Company, Montgomery Avenue & Berks Street Passenger Railway Company, Old York Road Passenger Railway Company, Fairhill Passenger Railway Company. Attorney-General McCormick instituted actions against these companies recently, asking for decrees on the ground that none of the companies had shown any intention of taking advantage of charter rights by building lines.

PITTSBURG, PA.—A bill in equity has been filed by the Homestead & Highland Street Railway Company against the Pittsburg & Homestead Electric Street Railway Company, the Homestead Street Railway Company, the Glenwood & Dravosburg Electric Street Railway Company, the McKeesport & Reynoldton Passenger Railway Company, the Second Avenue Passenger Railway Company, and the Second Avenue Traction Company. The traction company is the lessee of the other lines named. The matter in dispute is the possession of Eighth Avenue, Homestead, which the plaintiffs allege the defendants are occupying without any right, as the consent of the local authorities was not secured.

PITTSBURG, PA.—The Pennsylvania Railway Company has commenced suit against the McKeesport & Braddock Passenger Railway Company to restrain the latter from crossing its tracks at Brinton. It is alleged that the defendant's road is constructed through a sparsely settled district, and it will be a constant burden and trespass upon the property of the plaintiff company. It is proposed to cross the main line of the Pennsylvania Railway at Brinton upon a bridge erected at the plaintiff's expense. It is further claimed that the McKeesport & Braddock Railway is not a local street railway, located in a centre of population, but it is intended for the transportation of passengers between the city of McKeesport and the borough of Braddock, and is not such a railway as is authorized by the act of the Assembly under which the defendant is incorporated.

BALTIMORE, MD.—A company is to be formed to build an electric railway connecting Mt. Winans, Westport, Lansdowne and Meeter's Park, opposite Ferry Bar, with Baltimore. Among those interested in the project are: George A. Meeter, Dr. Wm. H. Crim, S. J. Carr, of the Carr-Lowery Glass Company; Wm. P. Porter, of Johns & Porter; Brosius Reed, George S Kiefer. The capital stock of the new company is to be $75,000. They intend to begin work immediately and to have the road built as soon as possible, which will be they think, within six months The projected road will connect with the City & Suburban line at the present terminus of the latter on the Washington road, near Mt. Winans and a connection will also be made with the Traction Company's lines at the foot of Ridgeley Street. The road will run by way of Westport to Meeter's Park, which will be the terminus of that branch. Another branch will continue out the Washington road to Lansdowne.

PERSONAL.

MR. JOHN H. FRY, for many years superintendent of the Detroit Citizens' Street Railway Company, has resigned his position on account of ill health, and Mr. John Grant has been appointed his successor.

MR. J. N. GRAHAM, general manager of the Consolidated Railway Supply Company, of Boston, was in New York this week on his way to the South on a business trip.

MR. HENRY FRYE, until recently an associate editor of *The Electrical World*, died near Folsom, N. M., on June 20, of consumption. Mr. Frye contracted a severe cold last fall which developed into pneumonia, and upon his recovery from the latter disease it became apparant that his lungs were seriously affected. At the beginning of the year, upon the advice of his physician, he reluctantly gave up editorial work and went to New Mexico, where it was hoped the dry climate would rapidly recuperate his health. Unfortunately, the weather there during the past season has been extremely unfavorable, and this, coupled with over-exertion in riding while residing on a ranch, led to the sad end. Mr. Frye was 26 years of age, and accepted a position on *The Electrical World* staff in 1892.

Record of Street Railway Patents.

UNITED STATES PATENTS ISSUED JUNE 18 1895.

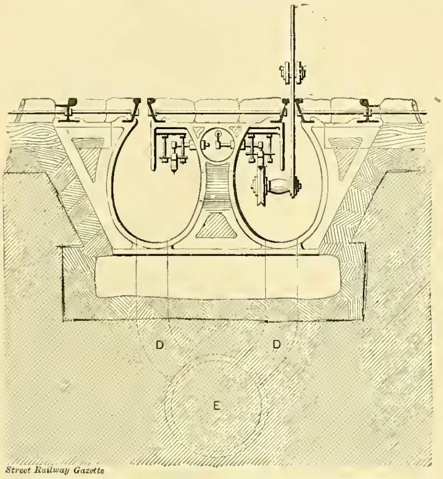
541 073. ELECTRIC-CAR BRAKE; George B. Damon Lowell, Mass., assignor of one half to Gardner W. Pearson, same place. Filed April 30, 1894. This is a combination with a compressed air tank and suitable pressure regulating devices which cut in a shunt circuit when the pressure in the tank falls to a minimum point and cut out the shunt circuit when the pressure rises to a maximum point. The electric motor which drives the air pump for supplying compressed air to the tank is operated from the shunt circuit The piston rod carries a brake shoe, a spring being adapted to press the brake shoe away from the wheel of the truck. A two way valve is inserted in the pipe leading from the tank to the cylinder and is adapted to exhaust air from the cylinder or to admit it thereto from the tank.

541,098. CROSSING FOR TROLLEY WIRES; John Kroger, Pleasantville, N. J. Filed Nov 3, 1894. This is a cross over for trolley wires which has a central depression in it and has portions of certain grooves cut away. A lock or guard is hinged or otherwise secured in the cutaway portions adapted to be raised by the passage of the trolley thereunder, returning to its normal position when the trolley passes.

541,099. BRAKE SHOE; Martin T. A. Kubierschky, Schenectady, N. Y., assignor to the General Electric Company, of New York. Filed March 30, 1895. The brake shoe is designed for use in connection with an electric brake and consists of a magnet formed with inner and outer poles-pieces arranged in a circle and in the same plane. The inner pole-pieces are formed of plates extending in a circle and breaking joints with the plates forming the outer pole-pieces.

541,126. TROLLEY WHEEL; Charles Smith, Belleville, N. J., assignor to the Eastwood Wire Manufacturing Company, same place. Filed March 30, 1894. The trolley wheel has a curved rim with solid sides along its peripheral edges. The rim extends below the sides and out of contact with the spokes of the wheel. The hub is continuous and from its opposite ends the radial separated spokes extend and merge into the solid sides, being curved inwardly at their inner ends. They are extended directly to the solid sides from the curved portions leaving the inner surface of the rim free and exposed to view between the spokes.

541,165. ELECTRIC RAILWAY; Rudolph M. Hunter, Philadelphia, Pa. Original application filed Jan. 12, 1887. Divided and this application filed Sept. 7, 1889. The electric motor is elastically supported upon the axle gearing with one of the axles of the car. A hinged frame connects the axle and motor shaft, so that the motor is adapted to travel around the axle. A spring opposes this action so that the motor is connected with the axle with an elastic connection.



No. 541,338.—CLOSED CONDUIT RAILWAY SYSTEM.

541,194. ELECTRIC SWITCH FOR RAILWAYS; Leonard Wheeler, Sioux City, Ia. Filed June 8, 1894. Arms which are conductors of electric currents are movably secured beneath the car platform by means of insulated plates and are adapted to be pressed downward upon plates secured upon the track rail. The arms are in communication with the return circuit of the car. Insulated levers are secured to the arms extending upward through the platform and wires connect the arms with the car controller. Contact plates are secured to the bottom of the car and the arms are adapted to press against the plates when in their normal position and to be detached from them when the switch is to be turned, wires being provided to connect the contact plates and the car wheel.

541,259. RAIL BOND; William E. Baker and Henry M. Brinkerhoff, Chicago, Ill., assignors to Carter H. Fitz Hugh, Lake Forest, Ill. Filed March 11, 1895. This is a bond which is used on a rail supported by a flanged girder. The bond is reversely bent upon itself and in electrical connection with the rail and girder, the girder end of the bond being presented at right angles to the girder.

541,268. CAR-FENDER; Adolphus Decker, Linoleumville, N. Y. Filed March 30, 1895. A cradle or receptacle is journaled on the supporting frame and a tilting fender is located in advance of the cradle with its upper portion resting upon the latter. The tilting fender is arranged so that it forms a skid to cause a person to be thrown into the cradle.

541,282. SAFETY-FENDERS FOR STREET CARS; George F. Kato, Jr., Jersey City, N. J. Filed July 28, 1894. Claim 2 reads as follows: "In combination with the car, the fender, the rod having a head and connected with the fender, the hooked arms automatically engaging said head when the fender is moved inward, the links connecting said arms to a revolvable disc, and a rod extending from said disc and adapted when actuated to rotate the same and free said hooked arms from said head, allowing the fender to descend."

541,299. FARE-RECEIVER AND AUTOMATIC CHANGE-MAKER; Herbert M. Sturgis, St. Louis, Mo., assignor of two thirds to William B. Taylor and James H. Smith, Dallas, Tex. Filed Nov. 12, 1894. An upright coin-assorting plate has on one side parallel flanges, between which are graduated spaces differing in size according to the size of the various coins. A series of lateral moving change slides is arranged one above the other adjacent to the graduated spaces of the coin-assorting plate. Pins pass through the aperture in the plate to move the slides by impinging the inserted coin against the rear faces thereof.

541,312. CAR-FENDER; James L. Canham, South Orange, N. J., assignor of nine sixteenths to Robert Avery, Brooklyn, N. Y., and J. H. Jacobs, Orange, N. J. Filed Jan. 22, 1894. A series of cables forms a yielding bed, and a sliding and spring-actuating auxiliary frame with a hinged outer section is flexibly connected with the main fender frame. A latch is carried by the latter frame and engages the auxiliary frame, a connection between the latch and the yielding bed of the main frame being provided.

541,338. UNDERGROUND CLOSED CONDUIT SYSTEM FOR ELECTRIC RAILWAYS; Adolph J. Smith, Milwaukee, Wis. Filed June 6, 1894. The conduit has one or more trolley chambers and an independent conducting chamber with a conducting wire located therein. Insulated metallic shafts communicate at intervals from the conducting chamber to the trolley chamber and are provided with a contact arm in the conducting chamber adapted to be rocked into contact with the conducting wires. There is an actuating arm in the trolley chamber together with the independently supported movable trolley track, provided with a staple or slotted guide through the actuating arm projects. (See Illustration.)

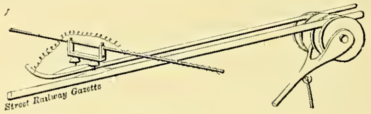
541,341. ELECTRIC ALARM SIGNAL AND INDICATOR FOR TROLLEY RAILWAYS; Jacques A. Buisson, New Orleans, La. Filed April 2, 1895. An auxiliary wire for a short]distance is extended parallel and is horizontally aligned with the main trolley wire or feeder and to each end of it an insulator is connected. Two additional insulators are on the main wire and opposite those on the auxiliary wire. Two U-shaped bars which are respectively connected with the opposite insulators have their parallel portions projected upward from the insulator. A supporting wire for each U-shaped bar is connected to the end of the parallel portions of the bar. (See Illustration.)

541,373. STREET CAR REGISTER; Onesime E. Michaud, St. Louis, Mo. Filed July 21, 1894. The register comprises a trip register wheel and a money register wheel which has ratchet teeth and an actuating bar carrying pawls adapted to co-operate with ratchet teeth on the trip register wheel and money register wheel, respectively. The guides are adapted to hold the pawls of the money register wheel out of engagement with the ratchet longer than the trip register pawl is out of engagement with its ratchet. A locking device is provided consisting of a fixed ratchet bar with a spring actuated pawl to co-operate with it whereby the former is prevented from moving backwardly until it reaches the limit of its stroke.

541,383. CAR FENDER; James Nagele, Clarenden, Ark., assignor of one half to E. F. Nagele, Memphis, Tenn. Filed Sept. 20 1894. Horizontal arms are provided which have their inner ends connected to the car and vertical arms rise therefrom having at their upper end an eye. Levers are pivoted to the outer ends of the horizontal arms, and have their inner ends limited in movement by the horizontal arms, the outer ends of the levers being reduced. Springs are coiled around the ends and sleeves are secured and guided by the ends and cushioned against the springs. Netting is connected to the eyes of the sleeves and arms and forms the receptacle.

541,393. SWITCH-TONGUE-OPERATING MECHANISM; Paul H. Smith, Columbus, O. Filed Aug. 18, 1894. Oppositely located hangers depend from the car frame and in them vertical shafts are loosely journaled. Wheels are journaled in the lower ends of the shafts and springs surround the shafts, their upper ends being engaged with the hangers and their lower ends with the shafts. Weight-carrying arms are fulcrumed to the hangers engaging with projections on the shafts, and a lifting lever fulcrumed beneath the car has a foot treadle projecting through the car platform and its rear end is adapted to engage with the under sides of the weights. There is a lever connection between the upper portion of the shaft and a handle lever on the car platform.

541,415. STREET CAR; Frederick A. Baier, St. Louis, Mo., assignor to the Brownell Car Company, same place. Filed Nov. 13, 1894. Claim I. reads as follows: "A car comprising a side sill, the end sill secured to the side sill, the main posts supported on the sills, the truss rod having its ends extending diagonally through the end sills inside of the side sill, curved outwardly over the side sill, and extending horizontally under the windows; means for securing the truss-rod to the main posts, and means for securing the ends of the truss-rod to the end sills.



No. 541,341.—ELECTRIC INDICATOR FOR TROLLEY ROADS.

541,419. CONTROLLER HANDLE; Charles L. W. Bischoff, Pittsburg, Pa. Filed Dec. 28, 1894. A collar is fastened to the controlling shaft and is provided with a socket, a removable bushing being secured to the collar and fitting in the socket. A projecting lug on the handle is adapted to engage with the bushing in the collar while another removable bushing in the handle socket is adapted to fit on the controlling shaft.

541,421. ELECTRIC RAILWAY SWITCH; Gustav Borgeson, Brooklyn, N. Y. Filed Jan. 15, 1894. This is a switch for cars having motive power incapable of pulling the forward end sidewise for shifting the switch by the car wheel and provided at each side with a lever and roller switch shifter subject to the control of the motorman. The switch shafting bar has a broad, curved head at each end and is placed transversely between each rail and the level of the rail and switch point and is supported by the roller shifters, respectively, for closing and opening the switch. A lever and link are provided for connecting the bar and switch point, the shifters taking effect between the rails and the beads of the bar.

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